TREES AND SHRUBS
OF MINNESOTA

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White Pine—Pinus Strobus

TREES AND SHRUBS OF MINNESOTA

BY

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AND

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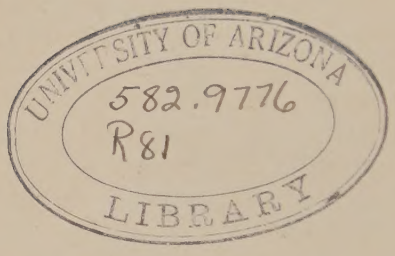

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PREFACE

The commercialism of the times can never entirely overwhelm those who in spare moments cultivate that interest in living things which is innate in most normal individuals. There are, indeed, occasional indications that the pressure of our mechanical civilization is causing many men and women to slip, occasionally, from their places as cogs in the wheels of modern organization to find refreshment in a study of plants or animals. It is for such citizens that this volume on the *Trees and Shrubs of Minnesota* is especially intended.

While this book has been prepared in the hope that it will be of interest and of use to those who cannot be professional botanists but who have the fineness of taste that impels them to observe and enjoy the infinite variety of plant form and structures, the authors have not sacrificed scientific accuracy for the sake of making a popular appeal. They have felt that those who are really interested in plants, and who really desire to have an intelligent knowledge of them, should be willing to master the few botanical terms, which are so necessary to precise description and exact knowledge. They have sought to make science popular by giving the general reader the most precise information possible concerning the trees and shrubs of the state, expressed in the simplest terms consistent with the precision that is essential to lasting satisfaction in the pursuit of knowledge.

Sixteen years ago, Professors Clements, Rosendahl, and Butters of the Department of Botany of the University of Minnesota published a volume entitled *Minnesota Trees and Shrubs* as the Ninth Report of the Botanical Survey of the state. While the contents of that report, particularly the illustrations, have been freely drawn upon, the present volume is not a second edition. The book has been rearranged, the descriptions fully rewritten when necessary, and in all cases critically checked against actual specimens of the plants themselves. On this task four years of careful study have been expended in an effort to place in the hands of amateur and professional botanists the most complete and trustworthy information possible concerning the woody plants of this geographically, geologically, and botanically diversified state.

All of the species growing naturally within the limits of the state and for which authentic records or specimens are available have been included. Some species hitherto reported have been omitted because of demonstrable errors of the earlier reports or inadequacy of information. It has been impossible to include all the forms that are cultivated as isolated individuals.

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Every effort has been made to describe those that will be met frequently in parks or gardens. In the text the descriptions of cultivated and introduced species may be distinguished readily from the descriptions of native plants by the finer print.

While the Herbarium of the Department of Botany has properly been the basis of the descriptions, the authors have for years studied the trees and shrubs in their natural habitats in the state. The knowledge thus gained has in all cases supplemented that based on the study of herbarium specimens.

The text deals with 47 families, 107 genera, 324 species, 40 varieties, 14 forms, and 18 hybrids, as compared with 42 families, 100 genera, 274 species, and 25 varieties of the volume published in 1912. Thus there has been material progress in our knowledge of the woody plants of the state.

A total of 250 species and varieties are illustrated. The illustrations of the first report have been supplemented by many new figures. These are by Mrs. Carol Young Alwin, Miss Faith Pomeroy Hall, Mr. Howard C. Ford, or by the authors.

The amateur may, if he cares to do so, omit the remainder of this preface. For the convenience of professional botanists it is proper to state that in the arrangement of families according to the Englerian System, instead of the Besseyan System followed in the first report, the authors have sought to facilitate use and avoid confusion by bringing the arrangement into conformity with the standard manuals and floras of the world.

While the authors believe that the Englerian System, particularly as regards the achlamydeous and haplochlamydeous series of the Archichlamydeae, does not express true phylogenetic development, nevertheless it has been thought best, for the reasons stated above, to follow this widely used system in a work that is intended mainly for identification and ready consultation. In spite of the decided merits, from the phylogenetic standpoint, of the newer systems of Bessey, Hallier, Wettstein, and Hutchinson, there is as yet considerable variation and lack of agreement in details, which makes it undesirable to adopt any one of them in a work of this kind.

The authors here have inclined to be conservative rather than radical in the segregation of genera and species. It has appeared to them best in most cases to retain the larger conception of genera, especially as proposed generic segregates are frequently very difficult to define when the whole flora of the world is taken into consideration. In the case of proposed specific segregates, they have felt that the groups are often essentially of subspecific rank, or that they in some cases merely represent extremes of individual variation, and have treated them accordingly. The most important of these cases are discussed in the text. Hybrids have been assigned binomial names, which in the text are preceded by the customary sign (×).

No attempt has been made to furnish a complete synonymy of each species. The synonyms cited are mainly those under which readers are likely to seek the plant in question. In a few cases the synonyms that explain the authors' choice of a name have been added.

In questions of nomenclature the authors have followed the International Rules as set forth by the Vienna Congress of 1905 and revised by the Brussels Congress of 1910. In pursuit of the policies here outlined, it has been necessary to make a few new names and new combinations. These are indicated in the text and are shown in the index in bold face type.

The ranges outside of the state of Minnesota of species of native trees have been taken chiefly from Sargent's *Manual* of 1922. The ranges of species of shrubs have been compiled from Britton and Brown's *Flora*, Gray's *Manual*, Bailey's *Manual*, Rehder's *Manual*, *The North American Flora*, and from various local floras. The works so consulted and freely drawn upon are too numerous to be listed.

The authors wish to express appreciation of the aid of Mr. C. R. Ball in the treatment of *Salix* and of Mr. F. V. Coville in the critical examination of *Ribes*. The authors, however, take full responsibility for the final treatment of these genera. They are indebted to Mr. C. E. Cary for much information regarding cultivated trees and shrubs and the extent to which various species are used for planting in Minnesota.

It is the earnest hope of the authors that the collaboration of those who may use this volume will serve to increase our available information concerning the kinds of plants to be found in our area, and especially concerning the important problem of the distribution of trees and shrubs within the state.

J. Arthur Harris, *Head*,
Department of Botany

University of Minnesota,
Minneapolis, Minnesota.
October, 1928.

CONTENTS

FRONTISPIECE . . . . . *facing* iii

PREFACE v

INTRODUCTION 1

KEYS TO FAMILIES AND GENERA 13

SUBDIVISION I. GYMNOSPERMAE 27

SUBDIVISION II. ANGIOSPERMAE 53

GLOSSARY 366

INDEX 373

TREES AND SHRUBS OF MINNESOTA

INTRODUCTION

TERMINOLOGY

In botanical practice the name of a plant is made up of two words, for example *Quercus alba*, *Populus tremuloides*, *Ulmus americana*, etc. The first word represents the *genus* or group to which the plant belongs and is always written with a capital letter. The second word indicates the *species* or kind and is rarely capitalized.* The meaning of the terms *genus* and *species* and the manner in which they are used can be made clear by the following illustration. In Minnesota there are three native kinds or species of pine, viz., the white pine, the Norway pine, and the jack pine. They all belong to the group or genus *Pinus* and are known respectively as *Pinus Strobus*, *Pinus resinosa*, and *Pinus Banksiana*. Somewhat closely related to the pines are other cone-bearing evergreens such as spruces, firs, and hemlocks. These different genera (plural of genus), together with several others, form a larger relationship that is known as the pine family or *Pinaceae*. In a similar manner roses, spireas, apples, plums, and many others are grouped into the rose family or *Rosaceae*. The ending *-aceae*, which is generally used to denote a family, is the feminine plural of the Latin suffix *-aceus*, meaning *like* or *related to*. The family name *Pinaceae* is really an adjective agreeing with *plantae* (plants) and meaning *plants related to the pine*.

After families the successively higher categories of plants are *orders*, *classes*, and *divisions*, each of which in practice is frequently subdivided into *suborders*, *subclasses*, and *subdivisions*.

The orders are generally named from a characteristic family of a group and for the most part have the ending *-ales*, e.g., *Fagales*, *Rosales*, etc. As in the case of family names the ending is in the feminine plural and signifies, for instance, in the last-named example above, *plants related to the rose family*.

The highest categories, viz., *Subclasses* and *Classes*, *Subdivisions* and *Divisions*, are designated by names that generally denote some fundamental morphological character upon which the respective category is based; thus *Monocotyledones* and *Dicotyledones* mean respectively plants with one seed

* It is capitalized when it is derived from the name of a person, or is the name of a genus or the old substantive name of a plant.

leaf and two seed leaves in the embryo. Similarly the subdivision *Gymnospermae* means the plants with naked seeds, and *Angiospermae*, those with seeds enclosed or hidden in the ovary of the pistil. Lastly, these two subdivisions constitute one of the major *Divisions* of the vegetable kingdom, the *Spermatophyta* or seed-bearing plants.

The relation of the various categories of the system of classification to each other is made clear by the following scheme:

Division
(Subdivision)
Class
(Subclass)
Order
(Suborder)
Family
(Subfamily)
(Tribe)
Genus
(Subgenus)
Species
(Subspecies, variety, form)

It should be borne in mind in dealing with these various categories that, although essential parts of the scheme of classification, they are only abstractions or concepts and not real entities. This is particularly true of the higher categories, but even the species, which in practice is the unit of classification, is in no ways a definite entity. Only the individuals that compose it have any real existence in nature. Since species are taxonomic

Outlines of Simple Leaves

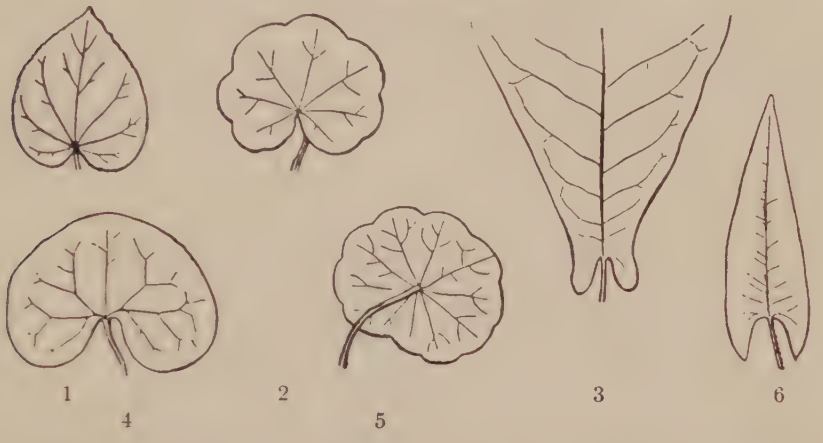
1. Linear. 2. Lanceolate. 3. Oblong. 4. Elliptic. 5. Ovate. 6. Oblanceolate. 7. Spatulate. 8. Obovate. 9. Cuneate.

concepts, their delimitation becomes to a considerable extent a matter of individual opinion or interpretation. Some workers habitually set very narrow limits to their species, others correspondingly broad ones, with the consequence that there is considerable disparity between different taxonomic

treatments. It is obvious, therefore, that knowledge, judgment, and experience, together with due respect for usage and regulations, must be the chief safeguards in avoiding confusion and misunderstanding.

In practice it has long been customary to treat units of lower rank than the species either as *subspecies* or as *varieties*. These are composed of individuals occurring in certain geographical parts of the range of the species and differing in some minor yet constant characters. They are designated by a symbol or a name, preceded by the abbreviation *var.* (*L. varietas*), the whole combination being written in the following form: *Populus nigra* var. *italica*.

Outlines and Bases of Simple Leaves



1. Cordate. 2. Orbicular. 3. Auriculate. 4. Reniform. 5. Peltate. 6. Sagittate.

If variants show no definite geographical segregation but occur sporadically throughout the range of the species, they are designated as *forms* (*L. forma*). Of similar botanical import are the innumerable horticultural variants and races of cultivated species. When such races differ from the normal species in well-marked botanical features they are usually treated as varieties or forms, while minor variation is denoted by strictly horticultural names such as the "Wealthy" apple, "Crimson Rambler" rose, etc. In the following pages no attempt has been made to distinguish these minor horticultural variants.

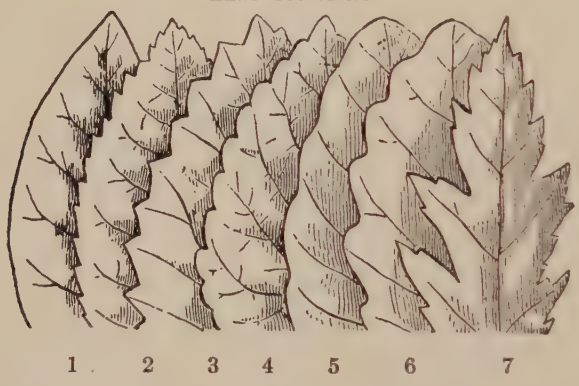
KEYS AND HOW TO USE THEM

In addition to the keys to genera and species under each family throughout the text, two general keys are provided on pages 13 and 17. The first of these, a key to families, is based chiefly upon the structure of the

flower and can therefore be used only when flowering specimens are available. The second and more extensive key to genera is based upon vegetative characters almost entirely, particularly the leaves and twigs, and is for use from the time the leaves appear until they fall. It has not seemed desirable to include a key to trees and shrubs in the winter condition, mainly because of the difficulties of differentiating genera and species on characters that often do not lend themselves to brief or even satisfactory description. A number of keys of this kind are available but most of them prove difficult even for the professional botanist and to the non-professional they are hopelessly confusing.

In a publication dealing with as many forms as the present volume, in spite of the valuable aids of numerous illustrations and rather full description, the only sure method by which a plant species can be determined is by tracing it step by step through the family, genus, and species keys. Generally also it is the quickest way, even though one may be tempted to make a short cut by referring at first to the illustrations.

Leaf Margins



1. Entire. 2. Serrate. 3. Dentate. 4. Crenate. 5. Undulate. 6. Sinuate. 7. Incised.

To insure the greatest facility, as well as accuracy, in the use of the keys, they are all based on the methods of alternatives, e.g., I. Petals present; II. Petals absent. The two alternatives (rarely more) are indicated by being equally indented and by the same series of signs, e.g., a and aa, b and bb, or 1 and 2, (x) and (y), etc. At every step the user should consider both alternatives before making a choice, since one generally throws light upon the other. In the construction of the keys the object has been to make them as simple and direct as accuracy will permit, yet the beginner is sure to encounter terms with which he is not familiar. In addition, he will be faced with the difficulty of deciding how much of a quality such as pubescence,

lobing, etc., a given term or phrase signifies. To aid the beginner in overcoming these difficulties and indeed to make it possible to use the keys successfully at all, explanatory figures and a glossary of terms have been

Apex of Leaf

1. Acuminate. 2. Acute. 3. Obtuse. 4. Truncate. 5. Retuse. 6. Emarginate. 7. Obcordate. 8. Cuspidate. 9. Mucronate.

appended. It is strongly urged that these be freely consulted whenever doubt arises. Above all, the temptation to guess at points of structure or the meaning of terms must be avoided, otherwise one is sure to go astray.

For the successful working of a key two rules must be constantly and strictly adhered to, viz., (1) accurate observation of the structure in question, (2) correct interpretation of the descriptive terms. The work of

Lobed Simple Leaves

1. Lobed. 2. Cleft. 3. Parted. 4. Divided.
Upper series pinnate, lower series palmate.

identification will be greatly facilitated by the use of a simple hand lens with magnifying powers of 8–12 diameters. Several makes of such pocket lenses are on the market but those made by the Bausch and Lomb, Leitz, Spencer and Zeiss Optical Companies are recommended.

PRONUNCIATION

The names of plants are best pronounced according to the so-called English pronunciation of Latin, i.e., there are no silent letters; there is a separate syllable for each vowel or diphthong; *c* and *g* are soft before *e*, *i*, *y*, *ae*, and *oe*, hard before *a*, *o*, and *u*; the simple vowels are given the ordinary English sounds, *ae* and *oe* are pronounced like long *e*. The accent for both generic and specific names is indicated throughout the text.

VERIFICATION AND DETERMINATION OF SPECIMENS

The beginner will find occasional trees or shrubs that he is unable to name. Even the student of more experience will now and then find very puzzling forms. In such cases it is necessary to make comparisons with authentic material in a good herbarium or else to refer the question to the professional botanist. The Department of Botany of the University of Minnesota is at the service of anyone who wishes to send to it either fresh plants or properly prepared specimens for verification or determination.

Compound Leaves

1. Odd-pinnate. 2. Abruptly pinnate. 3. Palmate.

Fresh specimens can be sent readily through the mails by wrapping in moist or waxed paper and sealing in a small tin box. Empty baking-powder cans or Nabisco wafer boxes make suitable containers for such purpose. Sometimes it may become necessary to send dried specimens. In such cases the plants should be pressed between layers of newspapers or blotters while still fresh so that the leaves will flatten out and retain their shape. When thoroughly dried they can be placed between cardboards, securely wrapped, and sent by parcel post. If plants are bundled up in ordinary paper containers while still fresh or partially wilted and forwarded by mail they usually are either decayed, or shrivelled up beyond recognition by the time

they reach their destination. For accurate determination flowers and fruits are desirable and sometimes absolutely necessary, and this fact should be kept in mind when collecting specimens.

METRIC SYSTEM

The metric system of measures has been used throughout this book. For any who are not familiar with this system it may be stated that the meter (m.) equals 39.37 inches, or approximately 3.3 feet, the decimeter (dm.) is approximately 4 inches, the centimeter (cm.) 2/5 of an inch, and the millimeter (mm.) 1/25 of an inch.

VEGETATIONAL REGIONS

From the standpoint of vegetation Minnesota may be divided into three great regions, occupied originally by the evergreen forest, the deciduous forest, and the prairies, respectively. Each of these regions has its characteristic plants, while comparatively few of the trees or shrubs of the state are equally at home in all three of them. The general outline of these regions is indicated in the map on page 8.

1. THE EVERGREEN FORESTS

The evergreen forest originally covered the northeastern one-third of the state, extending south to a line about halfway between Duluth and Minneapolis, and west nearly to the Red River Valley. These evergreen forests were continuous with those of Ontario on the northeast, and with those of Wisconsin and upper Michigan on the east. The characteristic trees of the mature upland forests of this region are the three native pines, white spruce, balsam fir, and white birch, while the swamps are filled with black spruce, tamarack, and white cedar. Deciduous trees, other than the white birch, are generally minor or temporary factors in the vegetation. Thus throughout the region such trees as the balsam poplar, aspen, red maple, pin cherry, black ash, yellow birch, and mountain ash are more or less frequent, but except where there has been interference with natural conditions they form a quite subsidiary part of the vegetation. The destruction of the coniferous forests by fire or lumbering is usually followed by a rapid growth of poplars and birches, which for a time form the dominant vegetation. If there is no further interference, this growth is in time replaced by a return of the conifers except where the original destruction has been so thorough and so widespread that there is no available source for seed. However in many places in the northern part of the state, fires have been so frequent as to keep the vegetation more or less permanently in the birch-poplar stage, and finally, by consuming most of the soil, so to limit the growth that it is reduced to mere thickets of these species.

MAP OF MINNESOTA, SHOWING THE NATURAL DISTRIBUTION OF FOREST AND PRAIRIE.
(Adapted from Upham's *Flora of Minnesota.*)

Here and there, throughout the region of coniferous forest there are definite inclusions of genuine hardwood forest, characterized by the dominance of such trees as the hard maple, basswood, American elm, and red oak. These patches of hardwood timber are usually found on rich morainal soil, and in situations that are relatively free from late spring frosts, adjacent to large lakes, or on ridges where there is free air drainage. They are sometimes quite without admixture of evergreens, but frequently contain some large white pines mingled with the deciduous trees. This type of forest is particularly well developed in the vicinity of Mille Lacs, and between that lake and Aitkin.

The shrubs as well as the trees of the evergreen forests are, many of them, characteristic. Here are found the white-flowered thimble-berry, the mountain maple, dwarf birches, elders, sweet-fern, several kinds of bush honeysuckle and the hairy climbing honeysuckle, high-bush cranberry, *Rosa acicularis*, and most characteristic of all, numerous heaths such as leatherleaf, Labrador tea, trailing arbutus, wintergreen, dwarf kalmia, and several kinds of blueberries and cranberries.

2. THE DECIDUOUS FORESTS

The deciduous forest occupied a strip extending across the state from southeast to northwest and forming an almost complete barrier between the evergreen forest and the prairies. Throughout this region the number of species of trees steadily diminished from southeast to northwest. It falls naturally into several rather distinct sub-regions.

The Forests of the Southeast Corner of the State.—The bottom lands and bluffs of the Mississippi were well forested, and in the southern counties the forests extended back twenty or thirty miles across the broken upland lying west of the river. A large part of this woodland is still standing in a more or less modified form. These are the most varied forests in the state. Besides the trees that also occur further north, there are found here such characteristic species as the black oak, shell-bark hickory, and black walnut on the uplands, and the river birch, swamp white oak, Kentucky coffee tree, and black maple in the bottom lands. Throughout this district white pines are fairly common on north-facing bluffs, and several natural groups of other northern conifers are known, such as a grove of jack pine near Rushford, a tamarack swamp in the vicinity of La Crescent, a small group of white cedars on Gwinn's Bluff between Winona and La Crescent, and the dwarf savin on a number of sandy bluffs. Red cedar and juniper are common on dry bluffs throughout the district.

To the westward these forests merge gradually into the prairies, through a region of prairie groves and savannas, while to the northward the strip

of forest becomes very narrow until in the vicinity of Lake Pepin it scarcely extends beyond the bluffs of the river and the short, deep side ravines.

The "Big Woods."—The great tract of pure deciduous forest known to the early settlers as the "Big Woods" occupied a region of rich calcareous clays in the south central part of the state. It was bounded on the east by a line running through Faribault and Northfield, thence northerly, passing about fifteen miles west of Minneapolis, and northwesterly, along the Mississippi River to the vicinity of St. Cloud. The westerly boundary extended somewhat irregularly from Mankato to St. Cloud. The area thus defined is about 100 miles long from north to south, and 40 miles wide at its southern end. All this area except the bottom lands of the Minnesota River, and occasional marshes, was occupied by heavy forest. In the less thickly settled parts of this region considerable patches of the original forest are still standing, but in general, the land is very fertile, and there has been more clearing of the forest here than in the more rugged southeastern counties. Throughout the Big Woods the dominant trees were the hard maple, basswood, white and red elms, and red oak. Other oaks are relatively rare, though the occasional specimens of bur oak reach larger size than in the next described area where they are much more abundant. There are no conifers except some red cedars on the banks of the numerous lakes, and tamaracks in the swamps of the northeastern part of the area.

The commonest tree of secondary size throughout the Big Woods is the ironwood, and the most abundant shrubs are dogwoods (especially *Cornus candidissima* and *Cornus rugosa*), sumacs, thorn apples, black haw, and *Rosa blanda.*

On the west, south, and southeast the Big Woods end abruptly along the line of the prairies, while on the northeast they pass more gradually into the following region.

The Region of Open Woods, Groves, and Savannas about the Twin Cities.—The Twin Cities lie in a region of very mixed soils due to the overlapping of the earlier (non-calcareous) and later (calcareous) sheets of glacial drift of the Wisconsin age. In addition, there are extensive sandy and gravelly out-wash plains, and to the northward extensive areas of dune sand.

In this region there was much prairie, particularly on gravelly subsoils, with groves of various sizes and some rather large areas of forest. The dominant trees are oaks—bur oak on the more calcareous soils, white oak in great abundance on the heavier acid soils, and scarlet and northern pin oaks on the sandier areas. In some cases these oaks reach good size, but often, over considerable areas, they are small and scarcely more than large shrubs. Around some of the lakes, and along the bluffs of the Mississippi, forest of better type obtains, and locally it may approximate that found in the Big Woods. Northwesterly, this country of savanna and poorly developed

woodlands extends up the valley of the Mississippi, especially on the east side of the river, nearly to the edge of the coniferous forest.

In the area now under discussion, conifers are rare, but somewhat more abundant than in the region of the Big Woods. Red cedar, and less frequently, juniper and yew, occur around lakes, and on the bluffs of the Mississippi and St. Croix rivers. White pine is fairly common along the St. Croix, and occurs in a few situations on the bluffs of the Mississippi. Tamarack swamps are frequent, and may be regarded as local islands of northeastern forest, surrounded by the more southern general vegetation. Finally, a larger inclusion of northern forest occurs in northeastern Anoka County, in the vicinity of Coon Lake where there is a considerable area of typical coniferous forest completely isolated from the main body of that formation.

The Heavy Forests of Chisago and Isanti Counties.—North and especially northeast of the district just discussed, a small body of heavy deciduous forest intervenes between this region of open woods and the coniferous forest. This tract reaches its best development in southern Chisago County, where the forest closely resembles the Big Woods in character, but with a considerable amount of white oak mingled with the maples, basswoods, elms, and red oaks. This difference seems to be due to the less calcareous character of the soils in the area now under discussion.

The Deciduous Forests of Northwestern Minnesota.—Northwest of the Big Woods the forests are of mixed type, often with dominance of oaks over considerable tracts. Both westward and northward the growth is less luxuriant, and finally in the region bordering the northern Red River Valley the deciduous trees are scarcely more than shrubs, and the country is locally known as "Brush-prairie." For the most part this is composed of bur oak, choke cherry, black cherry, aspen, elm, balsam poplar, pin cherry, plum, and willows.

Bottom-Land Forests.—Throughout the general region of deciduous forests a special type of vegetation is found on the bottom lands of the larger streams. In the most unstable situations, subject to frequent overflow, the chief trees are the willow and the cottonwood. On slightly higher land the white elm and soft maple are abundant along with such trees as the hackberry, green ash, and box elder. Such woody vines as the grape and Virginia creeper also occur on the less frequently flooded part of the bottom lands, and often reach great size in such situations.

The bottom-land forests of the larger rivers such as the Mississippi, the St. Croix, and the Minnesota, which are subject to long-continued flooding, are generally poorer in species than the bottom lands of smaller streams. As in all other parts of the deciduous forests, the number of species found

in the bottom-land forests diminishes pretty regularly from the southeast corner of the state towards the north and west.

3. THE PRAIRIE REGION

The prairies occupied much of southern and western Minnesota. The native woody vegetation in the prairie region may be considered under three heads: prairie groves, bottom-land and stream forests, and the shrubby plants of the open prairie.

Prairie Groves.—These are really detached portions of the general deciduous forests. They are usually found in the vicinity of lakes, or where a meandering stream protects a part of the upland. When they are abundant, as in the district about the Twin Cities, or in the region between the Big Woods and the Iowa line, the country partakes of the nature of savanna rather than of true prairie, and there is often but not always such a savanna-like region between the continuous forests and the open prairie.

The prairie groves partake largely of the character of the adjacent forests, but usually show a greatly diminished number of species both of woody and herbaceous plants. The outer fringe of such groves is usually occupied by bur oaks that straggle out into the surrounding prairie often as small trees, and even as dwarf shrubs. Generally speaking, the larger the grove, the more species it is likely to display, and even the Big Woods may be considered to be a prairie grove on an unprecedentedly large scale and with a corresponding diversity of flora. It bears somewhat the same relation to the beech-maple forests of the eastern United States that the ordinary prairie grove bears to the adjacent continuous forests.

Bottom-Land Forests.—The bottom-land woods of the prairie region are not essentially different from those of the deciduous forests, though here again the number of species is apt to be smaller. The willows and the cottonwood are the commonest trees and shrubs along the smaller streams, with the white elm persisting throughout the state along the larger streams, and the box elder fairly constant in occurrence.

Woody Vegetation of the Prairie Proper.—Certain shrubs are characteristically found in clumps, or scattered through the open prairie. As most of the prairie districts of the state are now under cultivation, these shrubs are now to be found chiefly as roadside plants, and particularly along railroad rights of way. The most characteristic of these are the prairie wild rose, the wolfberry, and *Amorpha canescens.*

KEYS TO FAMILIES AND GENERA

KEY TO FAMILIES

PAGE

I. Perianth definitely present, at least in some of the flowers (sometimes very small). (For II see p. 16.)

1. Petals present, i.e., perianth consisting of both calyx and corolla, which are more or less different.* (For 2 see p. 15.)

A. Petals separate. (For B see p. 15.)

a. Pistils several to many, free.

b. Stamens numerous, at least more than twice as many as sepals.

c. Flowers hypogynous.

d. Sepals 3, smaller than the petals, early deciduous; receptacle elongated..... *Magnoliaceae* 126

dd. Sepals 4, larger then the very small petals, persistent during anthesis; receptacle short..... *Ranunculaceae* 130

cc. Flowers perigynous..... *Rosaceae* 152

bb. Stamens 4 or 5..... *Rutaceae* 242

aa. Pistil 1, at least as to the ovary, simple or compound.

e. Ovary superior. (For ee see p. 15.)

f. Stamens numerous, at least more than 10.

g. Flowers perigynous, hypanthium cup-shaped..... ..... *Prunus* in *Rosaceae* 220

gg. Flowers hypogynous.

h. Flowers dioecious; vines..... *Menispermaceae* 132

hh. Flowers perfect.

i. Stamens in groups; ovary 5-celled; trees..... ..... *Tiliaceae* 281

ii. Stamens not grouped; ovary 1-celled; low shrubs ..... *Cistaceae* 286

ff. Stamens 3–10.

j. Fertile stamens of the same number as the petals (rarely less numerous).

k. Stamens standing opposite the petals.

l. Stamens and petals 6; pistil simple, ovary 1-celled..... *Berberidaceae* 128

ll. Stamens and petals 4–5; pistil compound, ovary 2–4-celled.

m. Tendril-bearing vines with palmately lobed or compound leaves..... *Vitaceae* 274

mm. Erect shrubs or trees with unlobed pinnately veined leaves..... *Rhamnaceae* 270

kk. Stamens alternating with the petals.

* In a few forms with inferior ovary, the calyx is greatly reduced and may easily be overlooked (some *Araliaceae, Caprifoliaceae, and Compositae*).

PAGE

n. Styles very short, style and stigmas together not over 1.5 mm. long.
o. Petals 4, strap-shaped, 1 cm. or more long; fertile stamens 4, staminodes 4, opposite the petals..... *Hamamelidaceae* 150
oo. Petals 3–5 (mostly 5), not strap-shaped, not over 5 mm. long; fertile stamens and staminodes not present in the same flower, staminodes when present in pistillate flowers alternating with the petals.
p. Leaves simple.
q. Leaves scale-like or needle-like.
r. Styles 3, ovary 1-celled..... *Tamaricaceae* 284
rr. Style 1, stigma much branched, ovary 6–9-celled..... *Empetraceae* 245
qq. Leaves not scale-like, ovary 3- or 4-celled.
s. Styles 3, lateral.... *Anacardiaceae* 246
ss. Style or sessile stigma 1, terminal.
t. Stigma sessile; flowers hypogynous without disk..... *Aquifoliaceae* 251
tt. Stigma borne on a short style; stamens inserted on a disk.... *Celastraceae* 254
pp. Leaves compound.
u. Leaves with translucent glandular dots; style and stigma 1; leaves palmately trifoliolate..... *Rutaceae* 242
uu. Leaves not gland-dotted; stigmas and styles 3; leaves pinnate, with 3–many leaflets..... *Anacardiaceae* 246
nn. Style and stigma together over 4 mm. long.
v. Styles and stigmas 2, ovary 2-celled, flattened and winged at the margin... *Aceraceae* 259
vv. Style and stigma 1, ovary 3-celled, not flattened nor winged..... *Staphyleaceae* 257
jj. Fertile stamens more numerous than the petals.
w. Leaves compound, flowers usually irregular (nearly regular in 2 genera of *Leguminosae*).
x. Pistil simple, ovary 1-celled with 1 parietal placenta; stamens 10 except in one genus with strongly perigynous flowers..... *Leguminosae* 232
xx. Pistil compound, ovary 3-celled; stamens 7 or 8; flowers hypogynous..... *Sapindaceae* 267
ww. Leaves simple, flowers regular.
y. Stamens 8; stigmas 2, ovary 2-celled, flattened and winged..... *Aceraceae* 259

PAGE

yy. Stamens 10; ovary 3–5-celled not flattened nor winged.
z. Ovary 3-celled, stigma 3-lobed; leaves deciduous ..... *Clethraceae* 303
zz. Ovary 5-celled, stigma capitate, leaves evergreen ..... *Ericaceae* 304
ee. Ovary inferior.
a. Stamens of the same number as petals and alternate with them.
b. Petals 4, ovary 2-celled ..... *Cornaceae* 295
bb. Petals 5.
c. Ovary 5-celled, hypanthium not extended above top of ovary, sepals minute ..... *Araliaceae* 293
cc. Ovary 1-celled, hypanthium saucer-shaped or tubular, sepals larger than petals. *Ribes* in *Saxifragaceae* 138
aa. Stamens more numerous than the petals.
d. Leaves opposite or whorled, ovules numerous, minute, fruit a capsule ..... *Saxifragaceae* 133
dd. Leaves alternate, ovules mostly 2 in each cell of the ovary, fruit fleshy ..... *Rosaceae* 152
B. Petals united.
a. Stamens twice as many as the petals ..... *Ericaceae* 304
aa. Stamens equaling the number of petals or fewer.
b. Ovary superior.
c. Flowers regular.
d. Stamens 2 ..... *Oleaceae* 324
dd. Stamens 5 ..... *Solanaceae* 335
cc. Flowers irregular ..... *Bignoniaceae* 336
bb. Ovary inferior.
e. Stamens free; ovary 2–3-celled, fruit a berry, capsule, or schizocarp.
f. Flowers in dense globular heads; stigma long exserted (nearly 1 cm.) ..... *Rubiaceae* 339
ff. Flowers not in dense globular heads; stigma slightly if at all exserted ..... *Caprifoliaceae* 341
ee. Stamens united by their anthers; ovary 1-celled, fruit an achene ..... *Compositae* 362
2. Petals absent or not distinguishable from the sepals.
a. Flowers in catkins or spikes, at least the staminate.
b. Stamens numerous, at least more than 10.
c. Flowers dioecious, both kinds in catkins; ovary superior, 1-celled ..... *Salicaceae* 54
cc. Flowers monoecious, only staminate in catkins; ovary inferior, 2-celled ..... *Juglandaceae* 78
bb. Stamens 2–8.
d. Staminate flowers in catkin-like spikes, perianth obvious, bracts inconspicuous, a single flower to a bract.
e. Pistillate flowers in catkin-like spikes, resembling the staminate, ovary superior ..... *Moraceae* 124

PAGE

ee. Pistillate flowers solitary, or in small clusters, ovary inferior ..... *Fagaceae* 104

dd. Staminate flowers in pendulous catkins, with conspicuous bracts, perianth concealed by the bracts, 3 flowers to a bract.. ..... *Betulaceae* 88

aa. None of the flowers in catkins or spikes.

f. Pistils several to many, free.

g. Stamens numerous; vines..... *Ranunculaceae* 130

gg. Stamens 4–5; prickly shrubs..... *Rutaceae* 242

ff. Pistil strictly one as to the ovary.

h. Perianth very irregular; ovary inferior..... *Aristolochiaceae* 125

hh. Perianth regular or nearly so; ovary superior.

i. Petals present in the bud, but falling as the flower opens, calyx reduced to a collar-like ring..... *Vitaceae* 274

ii. No perianth parts falling as the flower opens; sepals or calyx lobes evident.

j. Stamens 2..... *Oleaceae* 324

jj. Stamens 4–8.

k. Sepals 4, united into a bell-shaped or funnel-shaped perianth; stamens 4 or 8.

l. Leaves silvery or scurfy..... *Elaeagnaceae* 289

ll. Leaves green, not scurfy..... *Thymelaeaceae* 288

kk. Perianth with 5 or more sepals or lobes.

m. Sepals 6, entirely free; stamens definitely 6, stigmas 3..... *Liliaceae* 53

mm. Sepals 5–8 (if more than 5, united into a cup-shaped calyx); stamens 5–8; stigmas 2.

n. Ovary 2-celled, leaves opposite... *Aceraceae* 259

nn. Ovary 1-celled, leaves alternate... *Ulmaceae* 117

II. Perianth entirely wanting (sometimes represented by very minute scales, glands, or disks).

1. True pistils present, ovules enclosed in the ovary, stigmas evident.

a. Staminate flowers in catkins.

b. Bracts of the catkin simple, ovary 1-celled, superior.

c. Staminate flower with glands or a cup-shaped disk at the base; stigmas short, or expanded, 2–4-lobed, ovules many..... ..... *Salicaceae* 54

cc. Staminate flower entirely naked at the base; stigmas 2, long and slender, ovule 1..... *Myricaceae* 86

bb. Bracts of the catkin consisting of several united scales; ovary 2-celled, mostly inferior.

d. Scales of the staminate catkin conspicuous, more or less enclosing the stamens; pistillate flowers usually in catkins (except *Corylus*)..... *Betulaceae* 88

dd. Scales of the staminate catkins inconspicuous, the stamens exserted; pistillate flowers in groups of 1–3..... *Juglandaceae* 78

aa. Staminate flowers in heads or panicles.

e. Flowers in globular peduncled heads; stamens expanded at the apex; stigma undivided..... *Platanaceae* 150

PAGE

ee. Flowers in panicles; stamens in pairs, pointed; stigma 2-lobed... ..... *Oleaceae* 324

2. No true pistils present, ovules exposed or borne on the surface of scales, without ovary or stigma.
   a. Ovules and seeds exposed.
      b. Ovules 2, at the end of a naked stalk; staminate strobilus elongated; leaves fan-shaped, deciduous..... *Ginkgoaceae* 27
      bb. Ovules solitary, very short-stalked, surrounded at the base by small scales; staminate strobili nearly spherical; leaves needle-like, evergreen, not aromatic..... *Taxaceae* 29
   aa. Ovules borne on the scales of a cone, seeds enclosed between the cone-scales; leaves evergreen (except *Larix*), aromatic.
      c. Foliage leaves linear, needle-like, alternate or in fascicles; ovulate cone with distinct bracts subtending the ovule-bearing scales.... ..... *Pinaceae* 31
      cc. Foliage leaves often scale-like, opposite or whorled; ovule-bearing scales without obvious bracts..... *Cupressaceae* 46

KEY TO GENERA

I. Leaves needle-like or scale-like.
   1. Leaves alternate or fascicled.
      a. Leaves all alternate or scattered.
         b. Trees with fragrant leaves (when crushed).
            c. Leaves 4-sided in cross-section, on prominent bases.... *Picea* 35
            cc. Leaves flattened.
               d. Leaves bright green on both sides; bract scales projecting from the cones, trifid..... *Pseudotsuga* 33
               dd. Leaves dark green above, whitish beneath; bract scales included, rounded or mucronate-tipped.
                  e. Leaves sessile; cones large (5–10 cm.), erect, scales deciduous..... *Abies* 32
                  ee. Leaves petioled; cones small (1.2–3 cm.), pendent, scales persistent..... *Tsuga* 34
         bb. Shrubs, leaves not fragrant.
            f. Leaves small and scale-like, less than 3 mm. long.
               g. Low shrub, not over 3 dm. high; leaves densely pubescent ..... *Hudsonia* 287
               gg. Shrubs 1–3 m. high; leaves nearly or quite glabrous..... ..... *Tamarix* 284
            ff. Leaves more than 3 mm. long, not scale-like.
               h. Leaves strongly involute, blunt ..... *Empetrum* 245
               hh. Leaves flat, sharp pointed..... *Taxus* 29
      aa. At least some of the leaves fascicled.
         i. Leaves deciduous, many in each fascicle..... *Larix* 39
         ii. Leaves evergreen, 2–5 in each fascicle..... *Pinus* 41
   2. Leaves opposite or in whorls of 3.
      j. Leaves in whorls of 3, needle-like, jointed at the base.... *Juniperus* 51
      jj. Leaves opposite, scale-like or needle-like without jointed bases.
         k. Leaves all scale-like, twigs flattened, pairs of leaves of two kinds alternating..... *Thuja* 46

PAGE

kk. Leaves scale-like or needle-like, all alike on the same twig; twigs not flattened.....*Sabina* 47

II. Leaves not needle-like or scale-like.

1. Trees. (For 2 see page 20.)

A. Leaves simple. (For B see page 19.)

a. Leaves not lobed. (For aa see page 19.)

b. Leaves ovate or round, broad.

c. Leaves entire, mostly very large.

d. Leaves opposite, mostly cordate at base.....*Catalpa* 337

dd. Leaves alternate, rounded or narrowed at base.....*Magnolia* 127

cc. Leaves serrate to dentate.

e. Twigs very tough; fruit round, persistent; peduncle winged.....*Tilia* 281

ee. Twigs brittle; fruit disappearing in spring....*Populus* 54

bb. Leaves much longer than broad.

f. Leaves all alternate.

g. Leaves with 3 principal ribs from the base.

h. Sap milky; bark moderately rough or flaky. *Morus* 124

hh. Sap not milky; bark very rough with short corky ridges.....*Celtis* 122

gg. Veining of leaves strictly pinnate.

i. Leaves 2-ranked or apparently so.

j. Bark smooth, except when very old, more or less blotched.....*Carpinus* 91

jj. Bark rough.

k. Leaves oblique at base; bark coarsely furrowed.....*Ulmus* 117

kk. Leaves not oblique at base; bark finely furrowed.....*Ostrya* 93

ii. Leaves plainly 5-ranked or more.

l. Young bark with transversely elongated lenticels.

m. Bark peeling into papery layers.....*Betula* 94

mm. Bark not peeling into papery layers, inner bark and foliage with smell of bitter almonds.....*Prunus* 220

ll. Bark without conspicuous transversely elongated lenticels.

n. Buds covered by a single scale; fruit dry; seeds with hairs.....*Salix* 62

nn. Buds with numerous overlapping scales; fruit fleshy.

o. Twigs and branches with definite leafless thorns.....*Crataegus* 201

oo. Twigs and branches thornless, or with thorn-like leafy spurs.

p. Young twigs tomentose; fruit a pome.

q. Leaves mostly subcordate at the base; pomes numerous in panicles,

PAGE

purplish, less than 1 cm. in diameter.....*Amelanchier* 213

qq. Leaves narrowed or somewhat rounded at the base, fruit solitary or few in corymbs, bright red or yellowish, more than 12 mm. in diameter.....*Malus* 197

pp. Young twigs glabrous or puberulent, or scurfy, fruit a drupe.

r. Foliage white scurfy...*Elaeagnus* 289

rr. Foliage green.....*Prunus* 220

ff. At least some of the leaves opposite.

s. Leaves all opposite; lateral veins numerous.

t. Leaves finely and uniformly serrate.....*Viburnum* 344

tt. Leaves doubly serrate.....*Acer* 259

ss. Some of the leaves alternate; 3 pairs of lateral veins curving parallel to the margin.....*Rhamnus* 270

aa. Leaves lobed.

u. Leaves fan-shaped, 2- or 4-lobed, without a midrib....*Ginkgo* 27

uu. Leaves with an odd number of lobes; midrib prominent.

v. Leaves palmately veined, at least with 3 prominent ribs at the base.

w. Leaves opposite.....*Acer* 259

ww. Leaves alternate.

x. Mature leaves silvery white beneath.....*Populus* 54

xx. Mature leaves green on both sides.

y. Leaves broader than long, lobes entire or with a few coarse teeth.....*Platanus* 152

yy. Leaves longer than broad, lobes serrate..*Morus* 124

vv. Veining of leaves strictly pinnate.

z. Bark white and papery.....*Betula* 94

zz. Bark brown, more or less rough, not papery.

z′. Margin of lobes entire or with a few coarse teeth.....*Quercus* 105

z′z′. Margin of lobes serrate.

z″. Twigs and branches with definite leafless thorns.....*Crataegus* 201

z″z″. Twigs and branches thornless or with thorn-like leafy spurs.....*Malus* 197

B. Leaves compound.

a. Leaves palmately compound.

b. Leaflets 3, gland-dotted.....*Ptelea* 243

bb. Leaflets more than 3, not gland-dotted.....*Aesculus* 267

aa. Leaves pinnately compound.

c. Leaves abruptly pinnate (i.e. without terminal leaflet).

d. Leaves 4–25 cm. long; leaflets small, elliptical or oblong, rounded at the apex.

e. Leaves strictly once pinnate; leaflets entire..*Caragana* 239

ee. Leaves either once or twice pinnate; leaflets crenulate.....*Gleditsia* 234

PAGE

dd. Leaves 3–9 dm. long, twice pinnate; leaflets over 2.5 cm. long, ovate, acuminate ..... *Gymnocladus* 233

cc. Leaves odd pinnate (i.e. with a terminal leaflet).

f. Leaves opposite.

g. Leaflets entire or finely serrate ..... *Fraxinus* 325

gg. Leaflets lobed or doubly serrate ..... *Acer* 259

ff. Leaves alternate.

h. Leaflets entire; twigs with paired spines ..... *Robinia* 238

hh. Leaflets serrate or dissected; twigs not spiny.

i. Large nut-bearing trees.

j. Pith in plates, leaflets 11–23 ..... *Juglans* 80

jj. Pith solid, leaflets 5–11 ..... *Carya* 84

ii. Small trees with red fleshy fruit.

k. Sap milky; buds naked ..... *Rhus* 246

kk. Sap not milky; buds scaly ..... *Sorbus* 193

2. Shrubs or vines.

A. Leaves evergreen and leathery.*

a. Creeping or prostrate shrubs.

b. Leaves 1–4 cm. wide (mostly over 1.5 cm. wide).

c. Leaves narrowed to the base, margin serrate; stem puberulent; foliage with wintergreen flavor ..... *Gaultheria* 312

cc. Leaves cordate at the base, margin entire; stem bristly; without evergreen flavor ..... *Epigaea* 310

bb. Leaves 1–10 mm. wide.

c. Leaves narrowly linear, margin folded back so as to cover the lower surface ..... *Empetrum* 245

cc. Leaves linear-lanceolate to broadly ovate, lower surface exposed.

d. Stems bristly; leaves broadly ovate, less than 1 cm. long ..... *Chiogenes* 315

dd. Stems not bristly; leaves much longer than wide, mostly more than 1 cm. long.

e. Leaves glaucous beneath, oblong to lanceolate, mostly less than 5 mm. wide ..... *Vaccinium* 316

ee. Leaves green beneath, obovate to elliptic, mostly over 5 mm. wide.

f. Lower surface of leaves dotted with dark resinous glands, margin strongly revolute; plant glabrous throughout ..... *Vaccinium* 316

ff. Lower surface of leaves without conspicuous resinous glands, margin of young leaves scarcely revolute; plant pubescent when young ..... *Arctostaphylos* 313

aa. Erect shrubs.

g. Leaves with strongly revolute margins, woolly or whitened beneath.

h. Leaves woolly beneath ..... *Ledum* 307

hh. Leaves whitened beneath, not woolly.

* In summer the evergreen character can be determined by the presence of leaves of the previous season's growth.

PAGE

i. Leaves opposite.....*Kalmia* 308
ii. Leaves alternate.....*Andromeda* 311
gg. Leaf margin crenulate or serrate, scarcely revolute, leaves green or scurfy beneath.
j. Shrubs 2–5 dm. high, leaves scurfy beneath, margin crenulate.....*Chamaedaphne* 310
jj. Scarcely woody plants, 5–20 cm. high from creeping rhizomes.
k. Leaves finely serrate, broadly obovate or elliptic, aromatic.....*Gaultheria* 312
kk. Leaves coarsely serrate, narrowly obovate or oblanceolate, not aromatic.....*Chimaphila* 305
B. Leaves deciduous.
a. Leaves, or at least most of them, simple*. (For aa see p. 25.)
b. At least some of the leaves opposite or in whorls. (For bb see p. 22.)
c. Some alternate leaves present; 3 pairs of lateral veins curving parallel to the margin.....*Rhamnus* 270
cc. All the leaves opposite or whorled; lateral veins spreading.
d. Leaf margin entire (rarely some leaves with coarse entire-margined crenations or lobes).
e. Leaves silvery scurfy.....*Shepherdia* 291
ee. Leaves green.
f. Stipules present; leaves often whorled.....*Cephalanthus* 339
ff. Stipules absent; leaves in pairs.
g. Leaf scars running together to form a ring.
h. Stems with a hollow pith.
i. Low shrubs 3–10 dm. high.....*Symphoricarpos* 350
ii. Tall shrubs over 1 m. high, or twining vines.....*Lonicera* 353
hh. Stems with a solid pith.
j. Flowers and fruits axillary, in pairs or apparently solitary; leaves very short petioled.....*Lonicera* 353
jj. Flowers and fruits in terminal many-flowered clusters; leaves mostly long-petioled.....*Cornus* 295
gg. Leaf scars distinct.
k. Leaf scars elevated, nearly circular; flower and fruit clusters on short lateral branches.....*Chionanthus* 329
kk. Leaf scars not prominently elevated, crescent-shaped to semicircular; flower and fruit clusters at the end of the main shoot.....*Syringa* 329

* In a very few species of *Syringa* and *Forsythia*, some compound leaves occur in addition to the simple leaves.

PAGE

dd. Leaf margin serrate, dentate, or sharply lobed.
l. Leaves not lobed.
m. Bases of petioles meeting, leaf scars usually forming a ring.
n. Winter buds very small, concealed in the bases of the petioles.....*Philadelphus* 134
nn. Winter buds obvious while the leaves are still present.
o. Leaves sharply doubly serrate with bristle-tipped teeth.....*Rhodotypos* 169
oo. Leaves simply serrate or dentate.
p. Buds naked or with a single pair of visible bud scales; fruit fleshy.....*Viburnum* 344
pp. Buds with several overlapping scales; fruit a dry capsule.
q. Leaves finely serrate or crenate-serrate; petioles less than 1 cm. long.....*Diervilla* 360
qq. Leaves coarsely serrate; petioles more than 1 cm. long...*Hydrangea* 136
mm. Bases of petioles manifestly separate, leaf scars not forming a ring.
r. Pith hollow or chambered, serration of leaves coarse and irregular.....*Forsythia* 334
rr. Pith solid, leaves finely crenate-serrulate.....*Evonymus* 254
ll. Leaves lobed.
s. Petioles usually with stipules and glands.....*Viburnum* 344
ss. Petioles without stipules or glands.....*Acer* 259
bb. Leaves all alternate or fascicled.
t. Vines.
u. Leaves not lobed.
v. Leaves serrate; stem twining.....*Celastrus* 256
vv. Leaves entire.
w. Stems twining, unarmed.....*Aristolochia* 126
ww. Stems not twining, armed with prickles or thorns.
x. Petioles tendril-bearing, stem armed with epidermal prickles.....*Smilax* 53
xx. Petioles not tendril-bearing, stem armed with axillary thorns.....*Lycium* 335
uu. Leaves palmately lobed.
y. Margin of lobes entire; stem twining..*Menispermum* 132
yy. Margin of lobes toothed; stem not twining, supported by tendrils.
z. Tendrils coiling, without disks.....*Vitis* 275
zz. Tendrils attached by disks.....*Parthenocissus* 277
tt. Upright shrubs.

PAGE

a. Leaves not lobed, pinnatifid, nor dissected.
b. Leaves fascicled on the older branches.
c. Fascicles of leaves subtended by 1 or more spines or thorns.
d. Leaves thin, without stipules*.....*Berberis* 128
dd. Leaves thick, those of the young growth with conspicuous rounded stipules.....
.....*Chaenomelis* 191
cc. Fascicles not spiny.....*Nemopanthus* 253
bb. Leaves not truly fascicled (sometimes rather crowded on slow-growing shoots).
e. Buds with a single scale.....*Salix* 62
ee. Buds with several overlapping scales.
f. Leaves entire.
g. Leaves silvery scurfy.....*Elaeagnus* 289
gg. Leaves green.
h. Leaves small (rarely exceeding 2.5×5 cm.).
i. Leaves thick and leathery, petioles about 5 mm. long.....*Cotoneaster* 212
ii. Leaves thin, petioles 2 mm. long or less.
j. Leaves resinous beneath, short petioled.....*Gaylussacia* 316
jj. Leaves not resinous beneath, almost sessile.....*Vaccinium* 316
hh. Fully developed leaves larger (mostly exceeding 3×5 cm.).
k. Petioles 1–3 cm. long; bark not especially tough.
l. Petioles mostly 2 cm. long; leaves crowded towards the ends of the branches...*Cornus* 295
ll. Petioles 1–1.5 cm. long; leaves not crowded.
m. Leaves pointed at the apex
.....*Rhamnus* 270
mm. Leaves rounded at the apex
.....*Cotinus* 251
kk. Petioles less than 1 cm. long, bark very tough and fibrous.....*Dirca* 288
ff. Leaves serrate, dentate, or crenate.
n. Leaves coarsely crenate, crenate-dentate or dentate, the teeth or scallops at least 1 cm. broad.
o. Leaves cordate, very unequal at the base.....*Hamamelis* 150
oo. Leaves narrowed to the equal base..
.....*Quercus* 105

* *Caragana pygmaea* is likely to be sought here, as the leaflets of the compound fascicled leaves resemble fascicles of simple leaves.

nn. Leaves more finely serrate, dentate, or crenate.

p. Leaves at least twice as long as broad.

q. Leaves toothed above the middle only, the basal half entire.

r. Leaves with a few teeth at the rounded apex, otherwise entire, fragrant..... *Myrica* 86

rr. Leaves serrate or crenate-serrate for at least one-third of their length, apex pointed; not fragrant.

s. Serrations sharp, conspicuous, leaves mostly over 2 cm. wide..... *Clethra* 304

ss. Serrations appressed, somewhat crenate, leaves mostly under 1.5 cm. wide. *Prunus* 220

qq. Leaves serrate nearly or quite to the base.

t. Petioles 5 mm. long or less; leaves mostly under 1.5 cm. wide.

u. Petioles about 1 mm. long; leaves finely crenate-serrulate..... *Vaccinium* 316

uu. Petioles 2–5 mm. long; leaves mostly coarsely serrate (in one species finely but sharply serrate)..... ..... *Spiraea* 171

tt. Petioles over 5 mm. long, leaves mostly over 2 cm. wide.

v. Leaf scars forming transverse lines; buds acute; flowers and fruit in terminal clusters..... *Aronia* 192

vv. Leaf scars almost round; buds blunt; flowers and fruit axillary.

w. Principal veins breaking up into a network before reaching the margin; fruit red..... *Ilex* 252

ww. Principal veins curving upward and running to the margin; fruit black. ..... *Rhamnus* 270

pp. Leaves less than twice as long as broad.

x. Pith triangular or flattened in cross section.

PAGE

y. Leaves rhombic or obovate, narrowed to the base. . . *Betula* 94

yy. Leaves ovate or elliptical, rounded or cordate at the base . . . . . *Alnus* 102

xx. Pith round in cross section.

z. Petioles with a few large glands; foliage and bark with the odor of bitter almonds. . . . . *Prunus* 220

zz. Petioles without conspicuous glands; foliage and bark without characteristic odor.

(*a*) Thorny shrubs. . *Crataegus* 201

(*aa*) Unarmed shrubs.

(*b*) Leaves under 5 cm. in width, acute or short acuminate, finely serrate. . . . . *Amelanchier* 213

(*bb*) Leaves mostly over 5 cm. in width, long acuminate, coarsely doubly serrate. . . . . *Corylus* 89

aa. Leaves lobed, pinnatifid, or dissected.

(*c*) Leaves pinnatifid or dissected, aromatic.

(*d*) Leaves linear, once pinnatifid. . . . . *Comptonia* 88

(*dd*) Leaves elliptical in outline, completely dissected into linear lobes. . . . . *Artemisia* 363

(*cc*) Leaves lobed, not aromatic.

(*e*) Tall thorny shrubs. . . . . *Crataegus* 201

(*ee*) Shrubs of moderate height, unarmed or prickly.

(*f*) Stipules or stipular scars present.

(*g*) Leaves ovate, 3–6 cm. long, petioles stellate pubescent. . . . . *Physocarpus* 169

(*gg*) Leaves almost orbicular in outline, 6–15 cm. long, petioles glandular hispid *Rubus* 155

(*ff*) Stipules wanting.

(*h*) Leaves about twice as long as wide, obscurely lobed, entirely glabrous. . *Spiraea* 171

(*hh*) Leaves but little longer than wide, distinctly lobed, more or less pubescent or glandular. . . . . *Ribes* 138

aa. Leaves all compound.*

b. Unarmed climbing vines.

c. Leaves opposite, the petioles twisting about the support. . . . . *Clematis* 130

cc. Leaves alternate.

d. Vines with tendrils; leaves palmate, mostly with 5 leaflets. . . . . *Parthenocissus* 277

* Occasionally simple deeply lobed leaves occur on the flowering shoots of some species of *Rubus*.

PAGE

dd. Tendrils wanting; leaflets 3, the middle one long-stalked ..... *Rhus* 246
bb. Erect or trailing shrubs (the latter armed with prickles).
e. Leaves opposite.
f. Leaflets 3 ..... *Staphylea* 257
ff. Leaflets 5–9 ..... *Sambucus* 341
ee. Leaves alternate.
g. Margin of leaflets entire or slightly crenulate.
h. Leaves with an even number of leaflets (abruptly pinnate or digitate) ..... *Caragana* 239
hh. Leaves with an odd number of leaflets.
i. Leaflets 3 ..... *Ptelea* 243
ii. Leaflets 5 or more, odd pinnate.
j. Stems spiny or bristly.
k. Stems with paired spines, not bristly; leaves aromatic ..... *Zanthoxylum* 242
kk. Stems bristly, sometimes also spiny; leaves not aromatic ..... *Robinia* 238
jj. Stems neither spiny nor bristly.
l. Leaflets over 5 cm. long, glabrous.. *Rhus* 246
ll. Leaflets under 5 cm. long, pubescent.
m. Leaflets 5–7 ..... *Potentilla* 153
mm. Leaflets 11–49 ..... *Amorpha* 236
gg. Margin of leaflets toothed, lobed, or dissected.
o. Stems spiny, prickly, or bristly.
p. Leaves 2 to 3 times compound ..... *Aralia* 293
pp. Leaves once compound.
q. Stipules present.
r. Stipules adherent to the petiole, leaflets mostly 5–11, pinnate ..... *Rosa* 177
rr. Stipules free from the petiole, leaflets 3–5, often palmate ..... *Rubus* 155
qq. Stipules wanting, leaflets 5, palmate ..... *Acanthopanax* 294
oo. Stem not spiny, prickly, nor bristly.
s. Leaflets 3 ..... *Rhus* 246
ss. Leaflets 5–many.
t. Sap milky ..... *Rhus* 246
tt. Sap not milky ..... *Sorbaria* 176

SUBDIVISION I. GYMNOSPERMAE

Seed-bearing plants without closed pistils, ovules and seeds exposed, or protected by the separate but overlapping scales on which they are borne; pollen grains in nearly all cases entering the micropyle of the ovule and germinating within the developing seed; the body of the seed formed by the female gametophyte, developed previous to the fertilization of the egg and the development of the embryo.

Class I. Ginkgoales*

Stem much branched, woody, the wood without true vessels; leaves simple, fan-shaped, dichotomously veined; seeds wholly naked, fleshy; fertilization by means of free swimming sperms, which are discharged from the pollen tube within the developing seed; embryo with 2 cotyledons. A class represented among living plants by only the following family.

GINKGOACEAE GINKGO FAMILY

A family consisting of only the following genus. Flowers dioecious, the staminate cone-like, consisting of an axis bearing numerous stamens; stamens stalked, furnished with two pendent pollen sacs; pistillate flowers consisting of a naked stalk bearing at its summit a pair of ovules, each surrounded at its base with a collar-like growth; seeds drupe-like, the integument consisting of an outer fleshy coat, a firm stony coat, and a thin inner papery layer.

1. **GINKGO** L. Mant. ed. 2. 313. 1771.

The only genus of the family, containing the following species. (*Ginkgo*, the Chinese name of the tree.)

Ginkgo biloba L. Mant. ed. 2. 313. 1771.

MAIDEN-HAIR TREE, GINKGO

Salisburia adiantifolia Smith 1797.

A deciduous tree reaching in old age a height of 20 m.; trunk straight, extending to the top of the tree; branches long, ascending, or on some trees irregularly spreading,

* In the general classification of gymnosperms we follow Pilger in Engler and Prantl, *Die Natürlichen Pflanzenfamilien*, ed. 2, vol. 13. Pilger divides the gymnosperms into seven classes. Of these, three are extinct and are represented only by paleozoic and mesozoic fossils. Besides the classes treated in the body of the text, Pilger recognizes two classes of living gymnosperms, the *Cycadales* and the *Gnetales*. No representatives of either of these classes are found in Minnesota except as hothouse plants.

twigs not numerous, covered with many short spurs, or dwarf twigs; bark at first smooth, the epidermis separating as a shredded papery layer, later roughened and seamed longitudinally, gray; leaves borne scattered on the long twigs and in dense clusters on the spur shoots, petioled, glabrous, fan-shaped, usually two-lobed, 3–5 cm. long, 4–7 cm. wide, veins forking repeatedly and running free to the margin; petioles 3–5 cm. long; flowers as described under the family; seeds plum-like, scarlet, ill-smelling, about 2 cm. in diameter. (*Biloba*, two-lobed, referring to the leaves.)

GINKGO
(Staminate flowers at the left; mature seed at the right.)

Planted to some extent in the vicinity of the Twin Cities where it is perfectly hardy, but rather slow growing. A handsome tree with very ornamental foliage. The staminate tree is preferable, as the seeds of the pistillate tree have a very offensive odor. The Ginkgo tree is the sole survivor of a very ancient and interesting group, which in former geological periods occurred abundantly in many parts of the world.

It has survived only in China and Japan, and it is doubtful whether even in those countries any truly wild specimens occur.

Class II. Coniferae

Stem much branched, woody, the wood without true vessels, often with resin canals; leaves mostly needle-like or scale-like and evergreen; seeds either naked or concealed between the scales of a definite strobilus, hard shelled or sometimes fleshy; fertilization by means of a pollen tube, without the formation of swimming sperms; embryo with 2–many cotyledons. A large class, containing the vast majority of living gymnosperms.

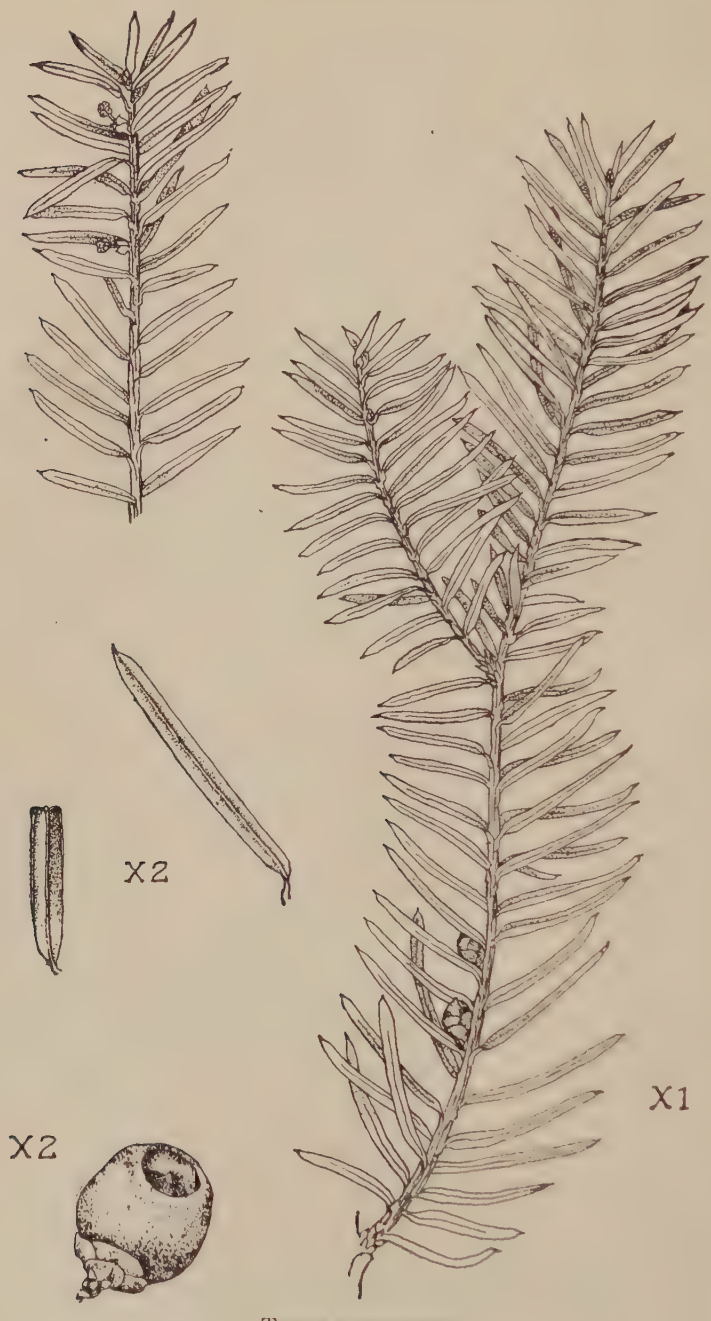
TAXACEAE YEW FAMILY

Trees or shrubs with alternate small evergreen linear leaves (not resinous-aromatic in the genus *Taxus*); flowers dioecious, the staminate consisting of a short axis bearing peltate stamens, each with 2–6 pollen sacs or sporangia, the pistillate of a single naked ovule borne at the end of a short, scaly pedicel; seed exposed at maturity, furnished with a fleshy outer coat. A family, as here limited, consisting of 3 genera and 12 species, widely distributed throughout the warmer parts of the north temperate zone, with 1 species in New Caledonia. Only the following genus occurs in Minnesota.

1. TAXUS L. Sp. Pl. 1040. 1753.
YEW

Non-resinous trees or shrubs; leaves evergreen, flattened, linear, bitter, borne alternately in a close spiral, but twisted so as to appear two-ranked; flowers in the axils of the leaves of the current year's growth, dioecious or monoecious; staminate flowers solitary, sessile, surrounded at the base by perianth-like bud scales from the midst of which projects a short axis bearing at the summit 4–12 peltate stamens, each with 4–6 pollen sacs; pistillate flowers usually solitary, rarely in pairs, borne on a short peduncle covered with minute, spirally arranged scales, the flower (or flowers) borne in the uppermost axil (or axils), consisting of a short axis bearing three pairs of opposite scales and a terminal, erect, naked ovule; the scales of the flower (but not those of the peduncle) considerably enlarged in fruit; the seed as it ripens becoming surrounded by a cup-like aril, which remains free from the seed, and becomes red and fleshy when ripe. Six closely allied species, natives of the north temperate zone, sometimes treated as subspecies of a single species. (Latin *táxus*, the yew tree, probably from Gr. *toxos*, a bow, referring to the immemorial use of the wood for making bows.)

1. Native straggling shrub; leaves 1–2 mm. wide, yellowish green ..... 1. *T. canadensis*
2. Cultivated upright shrub or tree; leaves 2–3 mm. wide, dull green with yellow stripes beneath ..... 2. *T. cuspidata*



TAXUS CANADENSIS

1. Taxus canadensis Marsh. Arb. Am. 151. 1785.

AMERICAN YEW

T. baccata var. *minor* Michx. 1796.

A low, straggling shrub about 1 m. high; winter buds scaly; spray very flat; leaves linear, short petioled, 10–25 mm. long, yellow-green, apex acute, mucronate, margin involute; flowers monoecious or dioecious, borne in the axils of the leaves of the new growth; seed erect about 4 mm. long, somewhat flattened, ellipsoidal with a short beak-like micropyle, dark brown, finely pitted, the ripe aril coral red, translucent, broader than long. (*Canadénsis*, Canadian.)

In Minnesota, common in the region of coniferious forests extending somewhat beyond their limits, also locally abundant in many shady ravines along the eastern margin of the state and in the southeastern corner. Newfoundland to Manitoba, south to Virginia and Iowa. Flowers in May, seeds ripe early in August of the second summer.

Alone of our conifers, the foliage of yew is without any resinous odor or taste. It sometimes is eaten by cattle, and may cause serious poisoning.

2. Taxus cuspidata Sieb. & Zucc. Flor. Jap. Fam. Nat. 2:108. 1846.

JAPANESE YEW

In its native habitat, a tree 15 m. high, in cultivation in Minnesota, usually an upright, compact shrub; leaves linear, 2–3 mm. wide, abruptly mucronate, dull green above, marked with two broad yellow bands beneath, or in some forms golden yellow throughout; spray usually forming a V-shaped trough; seed about 6 mm. long, compressed, slightly angled. (*Cuspidáta*, sharp pointed, referring to the mucronate leaves.)

Native of Japan, Korea, and Manchuria. Somewhat planted as an ornamental evergreen, especially in the vicinity of the Twin Cities.

PINACEAE PINE FAMILY

Trees or rarely shrubs; leaves and cone-scales primarily alternate, but sometimes with the foliage leaves clustered in dense fascicles in the axils of scale leaves or at the end of short shoots, foliage leaves linear, needle-like or flattened; flowers monoecious, cone-like, the staminate consisting of an axis that bears numerous usually scale-like stamens, each with 2 pollen sacs or sporangia, the pistillate with two distinct kinds of scales, the bracts or sterile scales, and the seed-bearing scales, one of which is borne in the axil of each bract, each seed-bearing scale bearing two inverted seeds on its upper side.

A very ancient family consisting of about 9 genera and 200 species, natives of almost the entire northern hemisphere, most abundant in the warm temperate regions although several species reach the arctic limits of tree growth, and a comparatively small number of species form the great evergreen forests of the cool temperate regions.

1. Foliage leaves all scattered, alternate.
   a. Leaves flat, linear, more or less twisted into two ranks.
      (1) Winter buds small, round, resinous; cones upright, with deciduous scales 1. *Abies*
      (2) Winter buds scaly, not resinous; cones pendent, with persistent scales.
         m. Leaves about 2 cm. long, their scars scarcely raised; bracts of the cone long, conspicuous 2. *Pseudotsuga*
         n Leaves about 1 cm. long, their scars raised on woody projections (sterigmata); bracts of the cone short, concealed between the seed-bearing scales 3. *Tsuga*
   b. Leaves four-sided in section, not at all two-ranked, their scars raised on woody projections (sterigmata) 4. *Picea*
2 Foliage leaves or some of them in fascicles.
   a. Leaves deciduous, some scattered, others in large fascicles 5. *Larix*
   b. Leaves evergreen, in fascicles of 2–5 6. *Pinus*

1. **ABIES** Mill. Gard. Dict. abr. ed. 4. 1754.

FIR

Evergreen trees, sometimes shrubby at high altitudes, trunk straight, running to the top of the tree, branches irregular or whorled, horizontal; leaves needle-like but usually flat and blunt, sessile, scattered, and borne in many rows, but often twisted into an apparently two-ranked arrangement, remaining on the twigs for many years, and when they fall, leaving the bark nearly smooth with round scars; buds usually round and covered with resin; flowers in spring, monoecious, the staminate in the axils of last year's leaves, very small, consisting of an axis bare at the base and covered above with the numerous stamens, stamens with a spur- or knob-like tip, pollen sacs opening transversely, pollen winged as in pine; pistillate cones erect, on the sides of the uppermost branches, the young cone with long and conspicuous bracts, which may later be hidden by the developing seed-bearing scales, cones ripening in the autumn of the first year, at maturity falling to pieces leaving their bare axes standing upon the branches; seeds winged, resinous. (L. and Gr. *ábies*, fir tree.)

Trees of the cooler parts of the north temperate zone and of the adjacent mountainous parts of the tropics; about 40 species, over one-half of which occur in the lands bordering the North Pacific. One other species occurs in eastern North America, eight in western North America.

1. Leaves 1–3 cm. long; native tree 1. *A. balsamea*
2. Leaves 5–7.5 cm. long; cultivated 2. *A. concolor*

1. **Abies balsamea** (L.) Mill. Gard. Dict. ed. 8. no. 3. 1768.

BALSAM FIR

A tree 15–20 m. high with a slender, straight trunk 3–5 dm. in diameter, and short, spreading branches forming a spire-like crown; bark smooth,

grayish, covered with numerous blisters containing resin; leaves resinous, very fragrant, flat, blunt, 1–3 cm. long, except on the uppermost branches twisted into an apparently two-ranked arrangement; buds small, globular, covered with a varnish-like resin; young pistillate cones purple, mature cones bluish green, cylindrical, 6–10 cm. long, the bracts usually concealed by the longer seed-bearing scales, ripening in autumn, when the scales fall away leaving the bare axes standing upon the branches. (*Balsámea*, referring to the abundance of balsam in the bark.)

Evergreen forests from Labrador and Newfoundland to Minnesota, south to Virginia and northeastern Iowa. In Minnesota common in the northeastern and northern parts of the state, not occurring beyond the region of evergreen forests except in a few scattered localities in the southeast corner of the state. Flowers in April or May, cones ripe in the autumn of the same year.

Seldom cultivated in Minnesota. Balsam fir in cultivation is very beautiful for a few years, but soon becomes thin and straggling.

Wood light brown, soft, weak, weight 24 lbs., seldom used except for paper pulp. The oleoresin from the blisters in the bark is "Canada Balsam," much used in optical instruments, microscopic slides, etc., as a transparent cement for glass. The fragrant dry twigs are often used to stuff sofa pillows and similar articles.

2. Abies concolor Lindl. & Gord. Journ. Hort. Soc. 5: 210. 1850.

A west American species with stout, bluish leaves 50–75 mm. long and about 2 mm. wide. It is sometimes planted in Minnesota, but, at least in the vicinity of Minneapolis, it is not hardy and the upper branches are often killed back in severe winters, keeping it in the form of a low bush. It is sometimes used for clipped hedges. (*Cóncolor*, of one color.)

2. PSEUDOTSUGA Carr. Trait. Conif. ed. 2. 256. 1867.

DOUGLAS FIR

Evergreen trees, trunk straight, running to the top of the tree, branches horizontal, irregularly whorled; leaves needle-like but flat and blunt, soft, sessile or slightly stalked, scattered, borne in many rows, remaining on the tree for several years, and when they fall, leaving the bark almost smooth or with slightly raised oval scars; buds scaly, not resinous; flowers in spring, monoecious, the staminate borne in the axils of last year's leaves, consisting of an axis, bare at the base and covered above with the numerous stamens; stamens with a spur-like tip, pollen sacs opening obliquely, pollen grains not winged; pistillate cones terminal or axillary, pendent at maturity, the bracts long, conspicuous, cleft at the summit into three lobes, cones ripening in the autumn of the first year, opening to discharge the seeds and finally falling entire from the tree; seed winged, not resinous. (*Pseudotsúga*, false hemlock, from Gr. *pseudes*, false, Japanese, *tsuga*, hemlock.)

Only 3 species, one native of southern California, one of Japan, and the following species widely distributed throughout western North America.

1. Pseudotsuga taxifolia (Lamb.) Brit. Trans. N. Y. Acad. Sci. 8: 74. 1889.

DOUGLAS FIR

P. mucronata (Raf.) Sudworth 1895.
P. Douglasii (Lindl.) Carr. 1867.

In Minnesota seldom exceeding 12 m. in height (on the Pacific Coast sometimes 80 m. high), trunk straight, running to the crown of the tree, branches horizontal, bark in young trees grayish, smooth, often with a few resin blisters resembling those of the balsam fir, in older trees becoming rough and brown and in old trees in their native habitat very thick, deeply fissured, and falling off in large scales; buds brown, sharp pointed, not resinous, covered with numerous papery scales; leaves fragrant, flat, blunt, and soft, arranged all about the twigs, or twisted into an apparently two-ranked arrangement; cones oval-cylindrical, pendulous, when ripe woody, 4-8 cm. long. (*Taxifólia*, yew-leaved.)

Native to the forests of the Rocky Mountains and the Pacific Coast region from British Columbia south to Texas, Mexico, and central California. Only the trees from the Rocky Mountain region are hardy in Minnesota, where the Douglas fir is often planted as an ornamental tree. It is very hardy but has a tendency to grow thin in foliage. It has proved a successful plant for evergreen hedges, stands clipping well, and will endure dry weather better than most conifers.

In its natural habitat, particularly in the vicinity of the Pacific Coast, this is one of the finest of North American trees, reaching a height of over two hundred feet, and a trunk diameter of fifteen feet. It is the most valuable timber tree of British Columbia, Washington, and Oregon.

3. TSUGA Carr. Trait. Conif. 185. 1855.

HEMLOCK

Evergreen trees, trunk straight, reaching to the top of the tree, branches irregular, spreading or often drooping, twigs slender; leaves linear, flat, and blunt, short-petioled, scattered, and borne in many rows but usually twisted into an apparently two-ranked arrangement, remaining on the twigs for two or three years but rapidly falling if the twig is dried; when they fall, leaving the twigs roughened by woody raised projections (sterigmata), on top of which are the leaf scars; buds scaly, not resinous; flowers in spring, monoecious, the staminate in the axils of last year's leaves, very small, with a bare stalk and an almost globular bunch of stamens, stamens with a spur- or knob-like tip, pollen sacs opening transversely, pollen grains not winged; pistillate cones terminal, drooping, with inconspicuous bracts; cones ripening the first autumn, opening at maturity and discharging the seeds after which the whole cone falls from the trees; seeds winged, slightly resinous. (*Tsúga*, the Japanese name for hemlock.)

Trees of North America and eastern Asia; 7 species; one other occurs in the eastern United States, and two in northwestern North America. One of the latter departs in several respects from the usual characters of the

genus, and is more properly segregated into a distinct genus. Only the following species occurs in Minnesota.

1. **Tsuga canadensis** (L.) Carr. Trait. Conif. 189. 1855.

HEMLOCK

A tall tree over 15 m. in height; trunk straight, upright, extending to the summit, branches spreading, nearly horizontal, the leading shoot in young trees usually more or less drooping; twigs slender, leaves flat, 8–13 mm. long, short-petioled, scattered, but twisted so as to appear two-ranked dark green above, white beneath; pistillate cones small, ovoid, 1.5 to 2.5 cm. long. (*Canadénsis*, Canadian.)

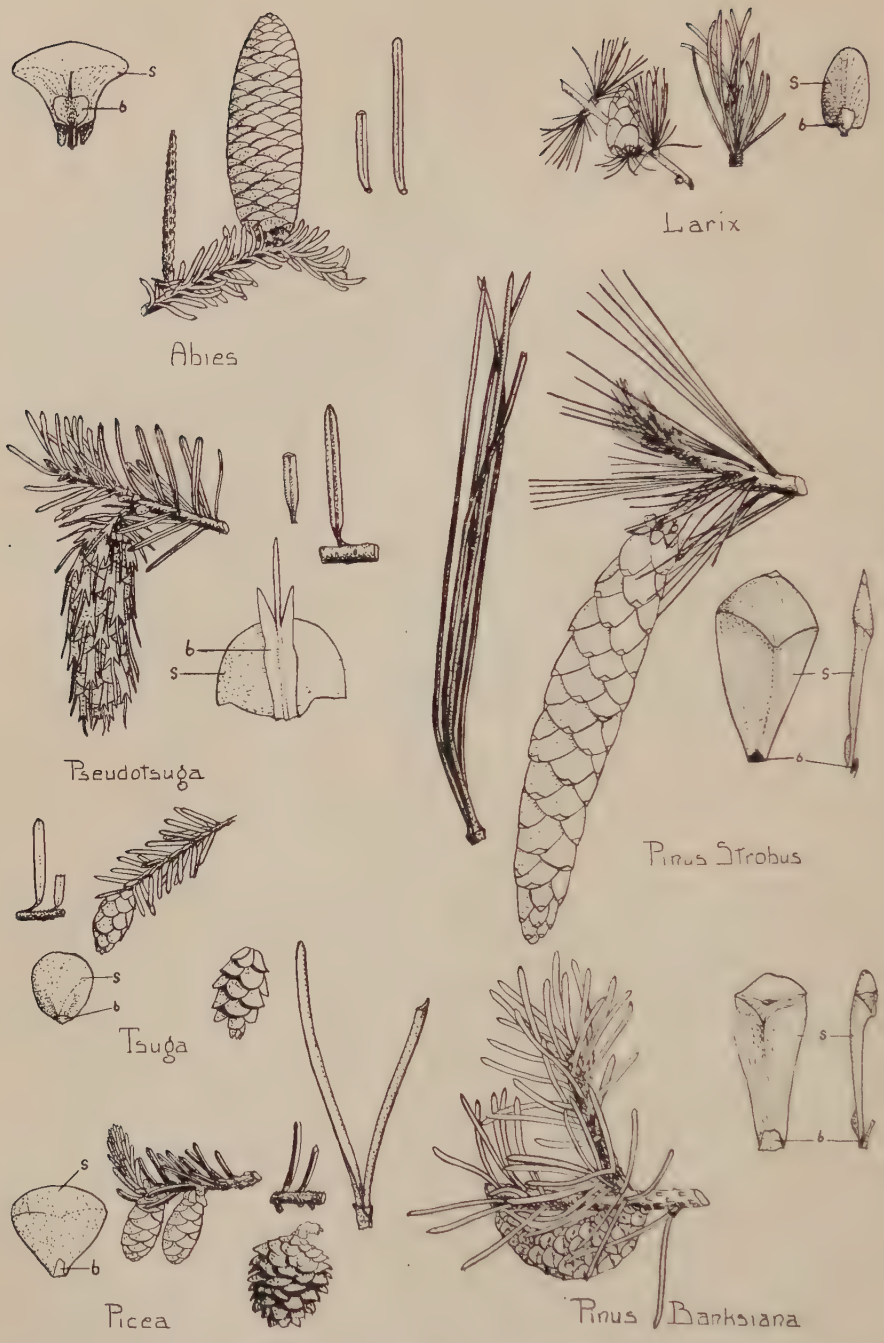
Coniferous forests, usually in acid soil containing considerable organic matter, from Nova Scotia to Delaware and southward along the Alleghanies, westward through northern Michigan and Wisconsin in which state it is abundant. The hemlock barely reaches Minnesota, occurring native only in Carlton County, just southwest of the head of Lake Superior.

Occasionally planted as an ornamental tree or as an evergreen hedge; neither the dry autumns nor the prevailing limestone soils of Minnesota suit the hemlock, and it is apt to die out after a few years. In upper Michigan and Wisconsin it is a valuable timber tree much used for coarse lumber, piles, etc. Wood light reddish brown, soft, coarse, brittle, and splintering, weight 26 lbs. The bark is extensively used intanning leather.

4. **PICEA** Link, Abh. Akad. Wis. Berlin, 1827: 179. 1827–30.

SPRUCE

Trees with straight trunks running to the top of the crown, and abundant, horizontal, drooping or slightly ascending branches; smaller twigs clothed with closely set, evergreen, needle-like leaves arranged in a close spiral; leaves usually four-sided, sharp pointed, spreading in all directions from the twig, borne upon small woody projections (sterigmata), which render the twigs rough when the leaves fall (spruce and hemlock leaves fall quickly when a twig is dried, fir and Douglas fir leaves are apt to remain attached to the dried twig); buds scaly, not resinous; flowers monoecious, the staminate solitary, lateral, consisting of an axis bearing the numerous overlapping, scale-like stamens, each of which bears two pollen sacs which open longitudinally, pollen grains winged as in pine; pistillate cones usually borne laterally on the twigs, sessile, or with very short peduncles, drooping, ripening the same year, dry and woody or membranous when ripe; the seed-bearing scales entirely concealing the small bracts; seeds winged, not resinous, discharged from the ripe cones which often remain on the tree for some time after the fall of the seeds, and finally fall off entire. (L. *pícea*, spruce or fir tree, from *pix*, pitch.)



ABIES BALSAMEA, PSEUDOTSUGA TAXIFOLIA, TSUGA CANADENSIS, PICEA MARIANA, LARIX LARICINA, PINUS STROBUS, AND PINUS BANKSIANA.
(Twigs with cones $\times \frac{1}{2}$, leaves and cone scales natural size; *b* bract, *s* seed-bearing scale.)

A genus of about 14 species of the far northern and the mountainous parts of the northern hemisphere. It includes the most boreal conifers in the world. Besides the following there are, in North America, one eastern and two western species.

1. Twigs spreading horizontally or ascending; cones less than 8 cm. long.
   a. Leaves 5–20 mm. long, sterigmata less than 1 mm. long; cone scales rounded at the apex, not conspicuously thin-margined.
      m. Leaves dark green, bluntly pointed, pleasantly aromatic when bruised; twigs minutely pubescent — 1. *P. mariana*
      n. Leaves pale bluish green, sharply pointed, very unpleasant smelling when bruised; twigs glabrous — 2. *P. canadensis*
   b. Leaves 20–30 mm. long, sterigmata 1–2 mm. long; cone scales narrowed or truncate at the apex, conspicuously thin margined.
      m. Leaves stiff, twigs glabrous — 3. *P. pungens*
      n. Leaves flexible, twigs pubescent — 4. *P. Engelmanni*
2. Twigs pendulous, cones 10–20 cm. long — 5. *P. Abies*

1. **Picea mariana** (Mill.) B.S.P. Prelim. Cat. N. Y. 71. 1888.

BLACK SPRUCE

Usually a small tree 8–10 m. high, rarely much taller, with a straight trunk rarely over 3 dm. in diameter, and short, mostly drooping branches forming a narrow, spire-like head; bark scaly, dark gray-brown; twigs slender, spreading, minutely pubescent, yellowish brown when young, becoming darker with age and often nearly black; sterigmata about 0.8 mm. long, standing almost perpendicular to the stem; leaves 5–15 mm. long, quadrangular, slender, mostly bluntly pointed, dark green with glaucous stripes on the upper faces, pleasantly aromatic in odor and taste; cones ovoid, 1.5–3.5 cm. long, borne on sharply recurved stalks, persisting on the branches for many years; cone-scales rigid, nearly orbicular, dark brown with paler entire or somewhat erose margins; seeds about 2 mm. long, dark brown, the wing obovate, somewhat oblique, 5–10 mm. long. (*Mariāna*, the Latin adjective derived from *Maria*, said to have a geographical reference in this case to *Terra Mariana*, or Maryland, where, however, this tree does not occur.)

Usually in cold acid bogs, often accompanied by tamarack. In Minnesota confined to the coniferous forest region and to cold bogs within a few miles of this region, extending as far south as northern Anoka County. Labrador and Newfoundland to the valley of the Yukon, south to New Jersey, Minnesota, and northern British Columbia. Seldom cultivated as it has little beauty to commend it.

Wood pale yellow, or nearly white, soft, weak, weight 28 lbs., seldom used for anything except paper pulp. The resinous exudation from the trunk is "spruce gum," and the leaves are boiled to produce the flavor of "spruce beer." At least 90 per cent of the Christmas trees sold in the Twin Cities are of this otherwise nearly useless species.

2. **Picea canadensis** (Mill.) B.S.P. Prelim. Cat. N. Y. 71. 1888.

WHITE SPRUCE

P. glauca (Moench) Voss. 1907.

A large tree up to 30 m. high, with a straight trunk 3–6 dm. in diameter and long stout branches forming a broadly conical head; bark scaly, light gray; twigs slender, spreading, glabrous, buff-colored, becoming somewhat darker with age; sterigmata about 0.8 mm. long, standing at an angle of about 45° to the stem. Leaves 8–20 mm. long, slender, quadrangular, sharp-pointed, pale bluish green, glaucous, having a very unpleasant strong odor when crushed; cones short-cylindrical, 3–5 cm. long, sessile or with short, straight stalks, usually deciduous within six months of the ripening of the seeds; cone-scales thin and elastic but firm, dark brown, broadly obovate, usually truncate at the tip, and nearly entire; seeds dark brown, the wing obovate 7–10 mm. long. (*Canadénsis*, Canadian.)

Chiefly in upland and at least moderately calcareous soils; in Minnesota, nearly confined to the region of coniferous forests, but straggling southward along the valley of the St. Croix River at least as far as the vicinity of Osceola, Wisconsin, where it is common on the dolomitic bluffs. Newfoundland and Labrador to the vicinity of Bering Sea, reaching the northern limit of tree growth, southward to northern New England, New York, the upper Great Lakes, the Black Hills, and the Rocky Mountains of Alberta and British Columbia, forming extensive forests north of the belt of pines. Flowers in May, cones ripe in the autumn of the same year. Wood light yellow, soft, weak, straight-grained, weight 25 lbs., used in eastern Canada for lumber, and for paper pulp, for which purpose it is more extensively employed than any other wood.

The white spruce is occasionally planted in Minnesota, as is also its variety *P. canadensis* var. *albertiana*, the Black Hills spruce, native of the Black Hills and northern Rocky Mountains, which is characterized by a narrower pyramidal crown and somewhat shorter and thicker cones. They do well in cultivation, but like all northern conifers, are apt to suffer from dry autumns and winters in the southern and western parts of the state.

3. **Picea pungens** Engelm. Gard. Chron. 1: 334. 1879.

COLORADO BLUE SPRUCE

A tree, reaching in its native habitat a height of 30 m.; trunk straight, rarely 1 m. in diameter, branches horizontal, stout, rather short, forming in young trees a conical crown, later becoming irregular, branchlets and twigs spreading or ascending; bark scaly, gray, usually tinged with red; twigs stout, yellow-brown, glabrous; sterigmata very prominent, about 1.5 mm. long; leaves 2–3 cm. long, quadrangular, stout, usually curved, very stiff and sharp-pointed, very blue and glaucous, particularly on young trees, unpleasant smelling when bruised (resembling white spruce); cones sessile or short-stalked, oblong-cylindric, about 7 cm. long; cone-scales rhombic, flexible, with thin margins and tip, acute, rounded or truncate at the narrowed apex, mostly erose dentate; seeds brown, 2–3 mm. long, the wing elliptical, about 7 mm. long. (*Púngens*, sharp-pointed, referring to the leaves.)

Native to the Rocky Mountain regions of Colorado, Wyoming, and Utah. Much planted as an ornamental tree on account of its striking color. It is hardy, but tends with age to become somewhat straggling and to take on a darker green color. Different specimens vary much in the intensity of the blue color and the best are sometimes propagated by grafting.

4. Picea Engelmanni (Parry) Engelm. Trans. Acad. Sci. St. Louis, 2: 212. 1863.

ENGLEMANN'S SPRUCE

A large tree, reaching in its native habitat a height of 40 m.; trunk straight, 1 m. or over in diameter, branches of moderate and nearly equal length, spreading horizontally, branchlets and twigs spreading, forming a nearly cylindrical crown, bark reddish brown, scaly; twigs stout, light brown, pubescent; sterigmata very prominent, 1–2 mm. long; leaves 2–3 cm. long, soft and flexible, quadrangular, sharp pointed, pale bluish green, often very glaucous, unpleasant smelling when bruised (resembling white spruce); cones oblong-cylindric or ovoid, about 5 cm. long; cone-scales rhombic or obovate, conspicuously thin margined, truncate or acute at the apex, and usually erose-dentate; seeds about 3 mm. long, nearly black, furnished with a large very oblique thin wing. (*Englemánni*, named for the botanist, George Englemann.)

Native to the mountains of western North America from Alberta and Alaska to New Mexico and Oregon. Occasionally planted in Minnesota. Entirely hardy, nearly as ornamental as the Colorado blue spruce, and more permanent than the latter species.

5. Picea Abies (L.) Karst. Deutsche Fl. 325. 1881.

NORWAY SPRUCE

P. excelsa (Lam.) Link.

A large tree reaching in its native habitat a height of 50 m.; trunk straight, 1–2 m. in diameter; branches of moderate length, spreading, branchlets at first horizontal, but soon pendulous, crown broadly conical; bark scaly, reddish brown; twigs moderately stout, bright yellow-brown, pubescent; sterigmata prominent, about 1 mm. long; leaves 1.5–2.5 cm. long, rather stiff, quadrangular, sharp-pointed, bright green, not unpleasant smelling; cones cylindrical, 12–15 cm. long; scales thick, firm, broad, and usually with an irregular margin. (*Ábies*, the Latin name of the spruce or fir.)

A native of Europe where it grows from the extreme north to the alpine regions of the Alps and Pyrenees. Flowering in April, cones ripe the same autumn.

More commonly planted for ornament than any other spruce, it is hardy and grows rapidly, but is apt to be injured by hot, dry summers, and loses its beauty after thirty or forty years, by the dying of the lower branches.

Wood reddish or yellowish, soft, fine-grained, much used in Europe for lumber for floors, boxes, cheap furniture, scaffolds, masts, spars, etc. The oleoresin from this tree, "Burgundy pitch," is used medicinally. The bark is used in tanning leather.

5. LARIX Mill. Gard. Dict. abr. ed. 4. 1754.

LARCH, TAMARACK

Trees with a straight, upright trunk, extending to the top of the tree, and indistinctly whorled, spreading or ascending branches; leaves needle-

like, bright green, turning yellow and falling in autumn, upon the new twigs borne singly in a close spiral, like the leaves of spruce, but upon the older branches and the trunk borne in tassel-like tufts, or fascicles (dwarf shoots), which produce twenty to thirty leaves each year for many years; flowers monoecious, staminate cones solitary, borne without accompanying leaves on the sides of twigs and branches, globose or nearly so, the stamens two-celled, opening longitudinally, pollen wingless; pistillate cones appearing with the leaves in early spring, red or greenish, the ovule-bearing scales shorter than the bract-scales, cones small, ripening and opening the first autumn, but remaining on the tree throughout the winter, the seed-bearing scales in our species concealing the short bracts. Our only deciduous conifers. Besides the following two, there are six other species native of western North America, Siberia, and Japan. (*Lárix*, the classical Latin name for the larch.)

1. Native tree; leaves 15–30 mm. long; mature cones 10–20 mm. long, cone scales glabrous 1. *L. laricina*
2. Cultivated tree; leaves 20–40 mm. long; mature cones 20–35 mm. long, cone-scales puberulent 2. *L. decidua*

1. Larix laricina (Du Roi) Koch, Dendrol. 2²: 263. 1873.

TAMARACK, AMERICAN LARCH

L. americana Michx. 1803.

A tree 12–20 m. high; trunk straight, 3–5 dm. in diameter; branches short, forming a narrow conical head in young trees and in crowded growth, longer and more irregular in old trees growing in the open; bark rough, scaly, red-brown; leaves triangular in section, 15–30 mm. long, very soft and flexible, light, bright green in summer, turning golden yellow in autumn; young cones red or greenish; mature cones dull brown, ovoid, 1–2 cm. long, composed of 10–12 scales; seed-bearing scales very convex, broadly ovate or nearly orbicular, glabrous, much exceeding the small acuminate bracts; seeds brown, 2–3 mm. long, about one-third as long as the broad unilateral wing which is broader at or above the middle. (*Laricina*, larch-like.)

Abundant in Minnesota in the region of coniferous forests, chiefly in bogs with the black spruce, but occasionally in drier situations where it reaches larger size, southward in cold swamps scattered throughout the hardwood region as far south as the Twin Cities and Lake Minnetonka. South of the Minnesota River known only from one or two localities in Scott County, from near Faribault, Rice County, and in La Crescent Township, Houston County. It occurs, however, at intermediate points on the Wisconsin side of the Mississippi. Labrador to the Yukon Valley, south to West Virginia, northern Indiana, Minnesota, and northeastern British Columbia.

In cultivation the tamarack grows well in soil much drier than that which it naturally inhabits. It is not, however, as handsome or graceful a tree as the European larch.

Wood light brown, hard, coarse, resinous, very strong and durable, weight 39 lbs.; much used for fence posts and fuel. In the northern part of the state the tamarack has been much injured and in some cases entirely killed out by the depredations of a sawfly.

2. Larix decidua Mill. Gard. Dict. ed. 8. no. 1. 1768.

LARCH

L. europaea De Candolle 1805.
L. Larix (L.) Karsten 1882.

A tree about 12 m. high and 5 dm. in diameter at the base; branches spreading, young twigs somewhat drooping; bark rough and scaly; leaves 2–4 cm. long, bright green, soft and flexible, turning yellow in autumn; young cones scarlet, mature cones yellow-brown, ovoid or oblong, 2.5–4 cm. long; seed-bearing scales broadly ovate, puberulent, about twice as long as the rounded or acuminate bracts; seeds dark brown, 3–4 mm. long, the wing unilateral, broadest towards the base. (*Decidua*, deciduous.)

A tree from the mountainous parts of Europe, growing well in dry soil. It is planted as an ornamental tree and does well in situations too dry for any of the evergreen conifers except the red cedar.

6. PINUS L. Sp. Pl. 1000. 1753.

PINE

Trees or sometimes shrubs with variously branched trunks; foliage leaves evergreen, needle-like, in fascicles of two to five,* the young twigs at first without foliage leaves and clothed only with scattered spirally arranged scales, the fascicles of foliage leaves appearing in the axils of these scales, each fascicle at first surrounded by a sheath of similar scales, which may later fall away, or may be permanent, the whole fascicle eventually falling away from the branch at the end of several years' time; flowers monoecious, usually on separate branches, the staminate clustered near the ends of the twigs surrounding the base of a shoot of the current season, consisting of an axis bearing numerous overlapping scale-like stamens, each of which bears two pollen sacs that open longitudinally; tip of stamen knob-like, or with a small scale-like appendage, pollen grains winged, the round grain bearing two air bladders, which are about equal in size to the grain proper; pistillate cones solitary or in small groups, lateral or subterminal, the ovule-bearing scales of the young cones longer than the bracts; cones ripening in two or three years, woody, the seed-bearing scales often much thickened at the outer end, the bracts small and inconspicuous; cones opening at maturity to scatter the seeds, or in some species remaining closed for many years; seeds usually winged, not resinous. (*Pinus*, the classical Latin name of the pine.)

About 70 species of the north temperate zone and the mountainous parts of the northern tropics, most abundant in the warm temperate regions;

* In a peculiar species of the southwestern United States there is only one foliage leaf in each fascicle.

among the most valuable forest trees for timber and for their various resinous products, turpentine, rosin, pitch, tar, etc.

The genus *Pinus* contains two subgenera, each with several sections. The various subgenera and sections are recognized by many authors as genera.

1. The exposed portions of the cone-scales but slightly thickened; stamens nearly crestless: leaves in fascicles of five, the scaly sheath usually quickly deciduous; wood soft: subgenus *Strobus* (soft pines) 1. *P. Strobus*
2. The exposed portions of the cone-scales much thickened; stamens bearing a crest-like scale; leaves in fascicles of 1–5 (2 in all of our species), the scaly sheath usually persistent around the base of the fascicle; wood often hard: subgenus *Pinaster* (hard pines).
   a. Leaves more than 1 dm. long.
      (1) Leaves thin, flexible; bark reddish; native 2. *P. resinosa*
      (2) Leaves thick, stiff; bark gray; cultivated 5. *P. nigra*
   b. Leaves less than 1 dm. long.
      (1) Trees usually 4–20 m. high.
         m. Leaves flexible, blue-green, 2.5–7 cm. long; cones reflexed; cultivated 3. *P. silvestris*
         n. Leaves stiff, yellow-green, 2.5 to 5.5 cm. long; cones pointing forward; native 6. *P. Banksiana*
      (2) Low branching shrub, 1–4 m. high, leaves 4–7 cm. long 4. *P. montana*

ADDITIONAL KEY TO SPECIES OF *PINASTER* GROWING IN MINNESOTA, BASED ON LEAF STRUCTURE

Leaves in all of our species semicircular or crescentic in cross section, and with two vascular bundles.

1. Resin ducts numerous, close to the surface; strengthening cells epidermal.
   a. Leaves over 1 dm. long; bundles close together 2. *P. resinosa*
   b. Leaves less than 1 dm. long; bundles widely separated.
      (1) Bundles embedded in sclerenchyma, epidermal cells nearly square 3. *P. silvestris*
      (2) Bundles not surrounded by sclerenchyma, epidermal cells radially elongated 4. *P. montana*
2. Resin ducts 2, in the midst of parenchyma; strengthening cells beneath the epidermis.
   a. Leaves over 1 dm. long 5. *P. nigra*
   b. Leaves under 5 cm. long 6. *P. Banksiana*

1. Pinus Strobus L. Sp. Pl. 1001. 1753.

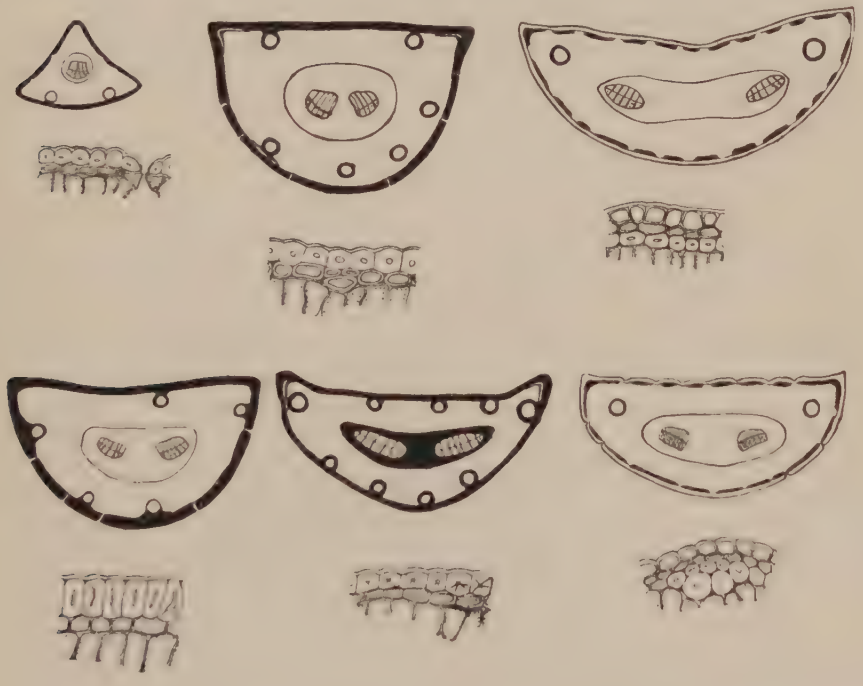
WHITE PINE

Large forest tree with a straight trunk up to 40 m. high, and up to 1 m. in diameter at the base; young trees with regular whorled horizontal branches, the older ones with strong, irregular, ascending branches forming an open irregular crown; bark of young tree smooth, greenish gray, very resinous, becoming very thick, gray, and roughly fissured; leaves in fascicles of five, the needles surrounded at first with numerous scales, which soon fall off, leaving them without a scaly sheath, fascicles usually falling at the

end of the second year; leaves slender, soft, 7–10 cm. long, triangular in section, minutely serrate; cones woody, cylindrical, stalked, ripening at the end of the second season, 10–15 cm. long, about 3 cm. wide when open, cone scales woody, thin, dark brown when ripe, the exposed parts glossy; seeds winged, escaping from the ripe cone. (*Stróbus*, the Latin name of some tree.)

Throughout the region of coniferous forests, chiefly on clay soils, also scattered in isolated groves in eastern Minnesota, especially on the river bluffs and in sheltered ravines along the St. Croix and Mississippi rivers, and for some distance up the larger tributary valleys; in the Root River Valley occurring as far west as Preston, Fillmore County. Newfoundland to Manitoba, south to Pennsylvania, Illinois, Iowa, and in the mountains to Georgia. Flowers in May, fruit ripe a year from the following September.

The most valuable timber tree in the state; wood light brown or reddish, soft, fine-grained, not strong, weight 24 lbs.; used for building construction, siding, doors, sash, etc. In cultivation the white pine is ornamental and does well in parts of the state where the late summers and autumns are not too dry. It flourishes in the soil of our hardwood regions better than any other pine. (See Frontispiece.)



Cross Sections of Leaves of Species of Pinus

P. Strobus, P. resinosa, P. nigra (above); P. montana, P. sylvestris, P. Banksiana (below). Diagrams ×20, detail of epidermis and the layers immediately beneath it ×150. In the diagrams the sclerenchyma layer is heavily shaded.

2. Pinus resinosa Ait. Hort. Kew. 3: 367. 1789.

RED PINE, NORWAY PINE

A forest tree 24–30 m. high, with a straight trunk 6–10 dm. in diameter, which extends to the crown of the tree; branches of young trees nearly horizontal, whorled, in old trees forming a rounded crown; bark reddish brown, thin, on the older branches and trunk forming broad flat scales; leaves in pairs, each pair surrounded at the base by a persistent scaly sheath; leaves slender, soft, 8–15 cm. long, semicircular in section, minutely serrate; cones ovoid, about 5 cm. long, and when open nearly as broad, standing straight out from the stem; cone-scales woody, thickened at the tips, the exposed part diamond-shaped with a scar in the center; seeds dark, winged, escaping from the ripe cone. (*Resinósa*, resinous, not particularly appropriate to this pine.)

Common in northern Minnesota where it once formed extensive, almost pure forests, chiefly on sandy soils, avoiding calcareous areas; not occurring beyond the limits of the region of coniferous forests. Nova Scotia and central Quebec to eastern Manitoba, south to Massachusetts, Pennsylvania, Michigan, and Minnesota. Flowers in May, cones ripening the second autumn.

Much used for timber though not considered as valuable as white pine. Wood pale reddish, hard, fine-grained, not strong, weight 30 lbs. Seldom, if ever, cultivated in Minnesota.

3. Pinus montana Mill. Gard. Dict. ed. 8. no. 5. 1768.

SWISS MOUNTAIN PINE, MUGHO PINE

P. Mughus Scopoli 1772.

Shrub or small tree, seldom over 3 or 4 m. high, branches flexible, twigs short, bark brown, roughened with small conical projections; leaves in clusters of two, 4–7 cm. long, pointed, thick, dark green, with a basal sheath 5–6 mm. long, dark brown, papery, and with torn edges; cones small, 3–4 cm. long, in groups of two or three, horizontal or oblique, subsessile, persistent; cone-scales rounded at the top, furnished with a rhomboid boss, which bears at its depressed center a large sharp-pointed spine. (*Montána*, of the mountains.)

Cultivated, native of the mountains of central and western Europe. A hardy, ornamental evergreen shrub used for covering rocky slopes, or combining with other and larger conifers. Several unimportant varieties are distinguished by the shape of the cones.

4. Pinus sylvestris L. Sp. Pl. 1000. 1753.

SCOTCH PINE, SCOTCH FIR

A tree up to 30 m. high, with a straight trunk, but in this state seldom over 15 m. high and often irregular, straggling and somewhat shrubby; branches irregular, bark red and smooth above, becoming grayish and scaly on the older trunks; leaves in clusters of two, bluish green, 3–8 cm. long, with a basal sheath 5–8 mm. long, wrinkled transversely and rough; cones small, 5–8 cm. long, yellow-brown, usually in clusters

of two or three, nearly sessile, horizontal or bent backward along the branch, cone-scales thin, woody, ending in a four-sided boss that in young cones bears a short, weak spine in the middle, which may persist in the mature cone but often disappears. (*Sylvéstris*, relating to the forest.)

Cultivated, native of Europe and of western Asia, occasionally planted for ornament. It is entirely hardy but seldom in this region forms anything but a small straggling tree with very little beauty.

Wood reddish brown, soft, easily split. Much used in Europe for building construction, taking the same position there that white pine does in our northeastern states.

5. **Pinus nigra** Arnold, Reise nach Mariazell, 8. 1785.

AUSTRIAN PINE

P. Laricio var. *austriaca* Endl. 1847.

Tree up to 25 m. high, with a somewhat irregular trunk and long horizontal branches in whorls, giving the young tree a thick conical form, and the adult a broad, rounded head; bark grayish brown; leaves in clusters of two, 10–15 cm. long, stiff, dark green, with a basal sheath 12 mm. long, gray, wrinkled; cones small, sessile, reddish, about 5 cm. long, projecting at right angles to the branches, solitary or in groups of 2 or 3, falling after they open, cone-scales thickened and with a rounded boss at the end, often with a dull spine arising from the center of the boss. (*Nigra*, black.)

Cultivated. *Pinus nigra* is a native of southern Europe and Asia Minor; only the northern variety, native of Austria, is hardy here. It is much planted as an ornamental tree, and is successful west and south of the natural range of our native pines.

Wood soft, resinous, durable. *Pinus nigra* with its varieties is the most valuable forest tree of southern Europe. It is used both for lumber and for the production of turpentine.

6. **Pinus Banksiana** Lamb. Pinus, 1: 7, pl. 3. 1803.

JACK PINE

P. divaricata Gord. 1858.

Usually a small tree 9–12 m. high, but occasionally taller, with a trunk about 3 dm. in diameter, head pyramidal, bark dark brown, irregularly divided into small scales; leaves in pairs, each pair surrounded at the base by a short persistent scaly sheath, leaves flat, rigid, 2–5.5 cm. long, minutely serrate; cones about 3 cm. long, curved, conical, sessile, pointing toward the ends of the branches, often failing to open at maturity and persisting on the tree for many years; cone scales woody, thickened at the tips, spineless; seeds blackish, winged. (*Banksiána*, named for Sir Joseph Banks, British naturalist, and president of the Royal Society.)

On sterile acid soils throughout the region of coniferous forest, often forming nearly pure stands on sandy outwash plains, a single outpost known in southeastern Minnesota near Rushford, Fillmore County. Western Nova Scotia and northern Quebec to the valley of the Mackenzie River, south to Maine, the southern shore of Lake Michigan, and Minnesota. Absent everywhere from calcareous areas.

Wood pale brown, soft, coarse-grained, weak, weight 27 lbs., used for fire wood and for posts, railway ties, mine timbers, lath, etc., but the least valuable of our native pines. Seldom cultivated as it has little beauty to commend it. Occasionally transplanted trees are to be found, mostly around farmhouses in districts where it is easily accessible.

CUPRESSACEAE CYPRESS FAMILY

Trees or shrubs; leaves and cone scales opposite or in whorls; foliage leaves needle-like or more frequently reduced to small flattened scales,which adhere to the twigs; flowers monoecious or dioecious, cone-like, the staminate consisting of an axis that bears several pairs (or whorls) of stamens each with 2–40 pollen sacs or sporangia, the pistillate cones without distinct "bracts," each fertile scale bearing 1–40 erect ovules; fruit a dry and more or less woody cone, or fleshy and berry-like.

About 16 genera and 130 species of cosmopolitan distribution.

1. Cones woody, twigs and spray flat, leaves scale-like, of two alternating types 1. *Thuja*

2. Mature cones fleshy, twigs and spray not flattened.
   a. Leaves usually opposite, scale-like on mature twigs, buds naked 2. *Sabina*
   b. Leaves in whorls of three, all needle-like, buds scaly 3. *Juniperus*

1. THUJA L. Sp. Pl. 1002. 1753.

WHITE CEDAR, ARBOR VITAE

Trees with fibrous bark, fragrant wood, and flat, fragrant spray clothed with the small overlapping scale-like leaves which adhere to the twigs by their inner faces; leaves opposite, of two kinds in alternating pairs, those on the face of the twig flat, those on the side of the twig doubled over the edge; flowers monoecious, the staminate consisting of an axis bearing two or three pairs of peltate stamens, each with 2–4 pollen sacs, pistillate with 4–6 pairs of thin oval scales, the uppermost and lower scales usually sterile, the middle ones each bearing 2–4 erect ovules; cone small, woody; seeds with lateral wings, borne usually two on each fertile scale. (*Thúja*, the Greek name for some evergreen tree.)

Four species, the others occurring in northwestern North America, Japan, and China. Only the following species is found in Minnesota.

1. Thuja occidentalis L. Sp. Pl. 1002. 1753.

WHITE CEDAR, ARBOR VITAE

Evergreen tree with straight or forked trunk, 15–20 m. high, and 5–10 dm. in diameter, the short horizontal branches forming a narrow conical head; bark of branches reddish brown, on old trunks forming loose scales;

spray much branched, flat, leaves except on leading shoots about 3 mm. long, scale-like; flowers in spring, cones ripening the same autumn, usually with two pairs of fertile scales; seeds with winged margins, two on each fertile scale. (*Occidentális*, western, i.e., native of the New World.)

Common in Minnesota in the northern portions of the region of coniferous forests, growing usually in wet situations, where it often forms dense pure stands, not common in acid bogs, occasionally in drier ground or on bare rocks, a single outpost of stunted specimens in southeastern Minnesota on limestone ledges at the summit of Gwinn's Bluff, southeastern Winona County. Prince Edward Island and eastern Quebec to Hudson Bay and the Saskatchewan Valley, south to Pennsylvania, northern Indiana, southern Minnesota, and in the mountains of North Carolina, chiefly on calcareous soils.

Often cultivated as an ornamental tree or shrub, and much used for hedges as it bears clipping well. In the southern part of the state, it often "winter kills" badly from lack of moisture following a dry fall. Several forms of this species, distinguished by varying habit of growth and color of foliage, are handled by nurserymen.

Wood light brown, coarse, brittle, weak, durable, weight 20 lbs., the lightest wood of the northeastern states; much used for posts, telegraph poles, shingles, and in the manufacture of canoes.

2. SABINA Mill. Gard. Dict. abr. ed. 4. 1754.

SAVIN, RED CEDAR

Trees or shrubs with fibrous bark and fragrant wood; leaves opposite or in whorls of three, scale-like and adhering to the twigs on mature branches, often needle-like on young plants or fast-growing shoots, and then with decurrent bases; flowers dioecious, terminal on short leaf-bearing shoots, the staminate with several pairs (or whorls) of peltate stamens, each bearing 2–6 pollen sacs; pistillate flowers terminating short branches, consisting of several pairs (or whorls) of minute scales, bearing the paired ovules in their axils; fruit fleshy, formed of several concrescent pairs (or whorls) of scales. (*Sabina*, from classic Latin *herba sabina*, the Sabine plant.)

About 20 species of the northern temperate regions, about one-third of which are natives of the western United States. A genus frequently united with *Juniperus* with which it agrees in the berry-like character of the cone, but from which it differs both in the intimate structure of the cone and in vegetative characters.

1. Upright shrubs and trees
   a. Scale-leaves acute; needle-leaves not marked with white stripes; berry blue, glaucous; native — 1. *S. virginiana*
   b. Scale-leaves, obtuse; needle-leaves marked above with 2 white bands; berry brown; cultivated — 2. *S. chinensis*
2. Prostrate matted shrub — 3. *S. horizontalis*

Sabina virginiana

1. Sabina virginiana (L.) Antoine, Cupress. Gat. 61. 1857.

RED CEDAR, SAVIN

Juniperus virginiana L. 1753.

Tree, in this state rarely over 10 m. high when well grown, with a straight trunk, and a broad conical head, often distorted or even a straggling, irregular, upright shrub; mature twigs covered with scale-like, opposite, triangular leaves, 1–2 mm. long, but on young trees, rapidly growing shoots, or occasionally on whole trees the leaves spreading, awl-shaped, 8 mm. long, opposite or sometimes in whorls of three, decurrent and not jointed at the base; foliage dark green in summer, becoming reddish in winter; fruit globose, borne on a straight scaly stalk, maturing the first season, dark blue and fleshy and much eaten by birds, which distribute the seeds. (*Virginiána*, Virginian, applied at an early date to many American plants.)

Dry, gravelly, usually calcareous soil, and rocky ledges, in the southern half of the state, most abundant on river bluffs southeastward. Nova Scotia to eastern North Dakota, south to Georgia and Mississippi. Flowers in May, fruit ripe in the autumn of the same year.

Wood red, fine-grained, soft, weak, fragrant, and very durable, weight 31 lbs. The wood is much used for chests, pails, posts, sills of buildings, lead pencils, etc. It seldom reaches commercial size in Minnesota. The tree is often planted as a small ornamental tree and does well even in dry situations where other evergreens will not grow. It is sometimes planted to form windbreaks, but this use is objectionable in connection with apple orchards as it harbors various species of the fungus, *Gymnosporangium*, which produces leaf rust of apple.

Numerous horticultural forms of this species are handled by nurserymen, varying in habit of growth and color of foliage. Some forms are quite glaucous.

2. Sabina chinensis Antoine, Cupress. Gat. 54. 1857.

CHINESE JUNIPER

Juniperus chinensis L.

A shrub or small tree; scale-leaves appressed, obtuse, juvenile leaves needle-shaped, acute, decurrent, marked above with two white bands; fruit brownish, about 1 cm. in diameter, usually with two or three seeds. (*Chinénsis*, Chinese.)

Native of China and Japan. There are numerous horticultural forms. Occasionally planted in Minnesota, especially the var. *Pfitzeriana* which has spreading branches and pendulous twigs with grayish green foliage.

3. Sabina horizontalis (Moench) Rydb. Bull. Torr. Bot. Club, 39: 100. March, 1912.*

CREEPING SAVIN

Sabina prostrata (Pers.) Antoine, 1857.
Juniperus Sabina var. *procumbens* Pursh, 1814.

Prostrate evergreen shrub, often spreading over a considerable area;

* This publication antedates by several months the publication of the same binomial in *Minnesota Trees and Shrubs*, 1912.

foliage strong-smelling, leaves bluish green, scale-like, triangular, or on young strong-growing shoots, awl-shaped; fruit on a short, recurved, scaly stalk, oval or irregular, dark blue, fleshy, ripening during the second summer. (*Horizontális*, horizontal.)

In Minnesota abundant in the extreme north, less abundant southward in the region of coniferous forests, locally abundant on exposed sandstone ledges in the southeast corner of the state. Newfoundland to British Columbia, south to New England, New York, the south end of Lake Michigan, southeastern Minnesota, and in the

LANDSCAPE, SOUTHEASTERN MINNESOTA
Sabina horizontalis (foreground) and Juniperus communis var. depressa (middle of plate).

mountains to Colorado; also in Asia. Flowers in May, fruit ripe in midsummer of the following year.

This form has been confused with the savin of Europe, *Sabina officinalis* Garcke (*Juniperus Sabina* L.), which is distinguished by its more erect habit and by blunter, more closely appressed leaves. The twigs of the European species are used medicinally on account of the irritating volatile oil they contain. The American form contains the same oil and has presumably the same medicinal action.

3. JUNIPERUS L. Sp. Pl. 1038. 1753.

JUNIPER

Evergreen trees and shrubs with fibrous bark; leaves in whorls of 3, needle- or awl-like; spreading, jointed at the base; winter buds scaly; flowers dioecious, the staminate with several whorls of peltate stamens each bearing 3–4 pollen sacs, pistillate axillary, consisting of several whorls of scales with a single whorl of terminal ovules alternating with the uppermost scales; fruit fleshy, formed of the concrescent scales of the uppermost whorl. (*Juníperus*, the classical Latin name.)

A genus of about 10 species, mostly of the Old World; often considered to embrace also the genus *Sabina*. Only the following species occurs in Minnesota.

1. Juniperus communis L. var. depressa Pursh, Fl. Am. Sept. 646. 1814.

PROSTRATE JUNIPER

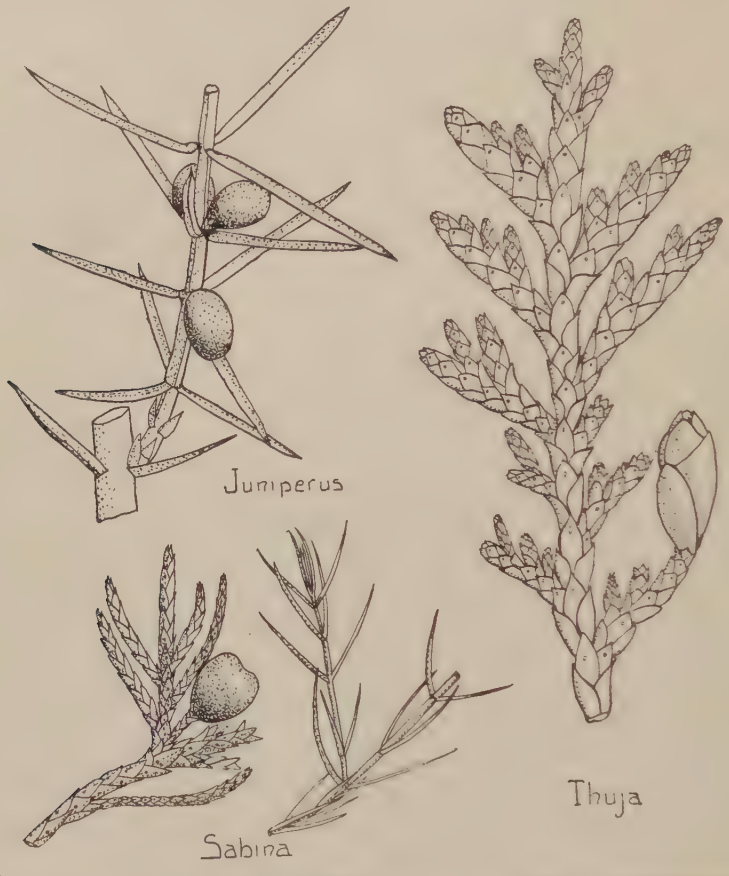
A depressed shrub with long prostrate branches turning up at the ends to form a dense mat about 1 m. high; leaves in whorls of three, jointed at the base, spreading, subulate, boat-shaped, very sharp pointed, marked with a bluish white stripe on the upper side, 8–15 mm. long, 1–1.5 mm. wide; flowers in the axils of the younger leaves, opening in spring; fruits borne on short scaly peduncles, blue, spherical, about 10 mm. in diameter, sweet, fleshy, and aromatic, ripening in the autumn of the third year; seeds 1–3, with distinct resin vesicles. (*Commúnis*, common; *deprέssa*, depressed, low.)

Occurring in very varied situations (steep bluffs, river bottoms, margins of swamps, etc.) throughout the state except in the southwestern prairie region, most abundant in the northern portion, and in the southeastern corner. Newfoundland to Alaska, south to Connecticut, Indiana, Minnesota, and in the mountains to Colorado. Blossoms in May, fruit ripe two years from the following August, sometimes persisting on the plant through the third winter.

J. communis is a polymorphic species, which in one form or another occurs throughout the cooler parts of the north temperate regions. Its varieties differ greatly from one another in habit, and somewhat in leaf form. The typical European form is an upright shrub or small tree with nearly flat leaves, grayish above. It is not known in Minnesota, but one of the European varieties, the Swedish juniper, *J. communis* var. *suecica* Loud. is occasionally planted. It is a narrowly columnar shrub with bluish

green foliage. A few specimens from the northern part of the state approach the boreal and alpine *J. communis* var. *montana* Ait., which is an entirely prostrate shrub with appressed leaves shorter and broader than in var. *depressa*. No Minnesota material has been seen, however, which can be referred clearly to var. *montana*.

The nearly ripe berries of juniper are used medicinally as a diuretic, and are employed in the manufacture of gin.



JUNIPERUS COMMUNIS VAR. DEPRESSA THUJA OCCIDENTALIS
SABINA VIRGINIANA (fruiting twig and twig from young tree).

SUBDIVISON II. ANGIOSPERMAE

Seed-bearing plants with closed pistils; the ovules and seeds developing within a closed ovary; the pollen grains received by, and germinating upon the stigma; the body of the seed (endosperm), not the female gametophyte, developing after fertilization of the egg, and during the development of the embryo.

Class I. Monocotyledons

Embryo with one cotyledon, stem with numerous scattered vascular bundles, without secondary growth in thickness by means of cambium; flowers usually trimerous. In this latitude monocotyledons are nearly all herbs with parallel-veined leaves. The class contains several large groups of tropical trees and shrubs such as the palms and bamboos. The only genus of woody monocotyledonous plants occurring in Minnesota belongs to the following family.

LILIACEAE LILY FAMILY

Herbs or woody plants, sometimes woody vines, with alternate, simple, linear or lanceolate, to ovate or broadly cordate leaves; flowers regular, mostly perfect, rarely imperfect, perianth segments usually 6, in two alternating whorls or cycles, mostly similar in form and color; stamens 6; carpels 3, united; ovary 3-celled or 1-celled with 3 parietal placentas, superior; fruit a capsule or a berry.

In our flora only the following genus is woody.

SMILAX L. Sp. Pl. 1038. 1753.

GREENBRIER

Woody or herbaceous vines, usually climbing by a pair of tendrils at the base of each petiole; leaves alternate, simple, entire or sometimes lobed, lanceolate to ovate or broadly cordate, net-veined, with 3-7 prominent nerves; flowers in umbels on axillary peduncles, dioecious, small, yellowish green; perianth segments distinct, deciduous; stamens 6, filaments inserted on the base of the perianth segments; staminate flowers without a pistil; pistillate flowers usually smaller than the staminate and with 1-6 abortive stamens, stigmas thick and spreading, ovary 3-celled with 1-2 ovules in each cell; fruit a berry, usually bluish black, sometimes red or purple. (*Smilax*, the Greek name of a woody climber.)

A genus of about 200 species, widely distributed but most abundant in tropical America, temperate Asia, and the Mediterranean region; 17 species occur in the United States. The following is the only woody species occurring in Minnesota.

Smilax hispida Muhl. in Torr. Fl. N. Y. 2: 302. 1843.

PRICKLY GREENBRIER

Stems climbing, the lower and older parts generally thickly beset with long bristly prickles, the flowering branches mostly naked; leaves membranous, deciduous, ovate, the larger ones heart-shaped, mostly 7-nerved, sharply pointed, or acuminate at the apex, margin usually fringed with minute teeth; peduncles 2–5 cm. long, umbels 6–20-flowered, berries bluish black, 5–6 mm. in diameter. (*Hispida*, referring to the prickly stem.)

In woods and thickets throughout the southeastern part of the state; infrequent as far west as Blue Earth County and north to Kanabec County. Connecticut and Ontario to Minnesota, south to Virginia and Texas.

Class II. Dicotyledons

Embryo with two cotyledons; vascular tissue of stem forming a cylinder with distinct central pith, stem increasing in thickness by means of a cambium; flowers usually pentamerous or tetramerous.

SALICACEAE WILLOW FAMILY

Trees or shrubs with alternate, simple leaves; flowers dioecious, both kinds in catkins, each flower subtended by a bract, without perianth; the staminate with 2–many stamens, the pistillate with a single compound pistil of 2–4 carpels; ovary 1-celled, placentas parietal; seeds numerous, covered with silky hairs; stigmas 2–4, each usually 2-lobed.

1. Buds with several scales, bracts of the catkins fringed, stamens usually numerous ..... 1. *Populus*
2. Buds with one scale, bracts entire, stamens 1–10, usually 2 ..... 2. *Salix*

1. POPULUS L. Sp. Pl. 1753.

POPLAR

Trees with round or angular branches and resinous buds covered with several scales; leaves broad, more or less heart-shaped, long-petioled, stipules minute, fugaceous; flowers appearing before the leaves in spreading or hanging catkins, each borne on a cup-shaped, somewhat oblique disk and subtended by a fimbriate, incised scale; staminate flowers with 8–60 stamens, their filaments distinct; pistillate flowers with 2–4 united carpels

and 2–4-lobed or entire stigmas; ovary 1-celled, with 2–4 parietal placentas; fruit a capsule; seeds hairy. (*Pópulus*, the classical Latin name.)

A genus of about 30 species, widely distributed throughout the northern hemisphere. About 20 species occur in North America.

1. Leaves densely white tomentose beneath, retaining the tomentum in age 1. *P. alba*
2. Leaves not white tomentose when mature, glabrous or sparingly pubescent.
   a. Leaves with rounded or channeled petioles.
      (1) Leaves ovate to ovate-lanceolate; petioles and lower surface not hairy 2. *P. balsamifera*
      (2) Leaves broader, cordate; petioles and veins of lower surface pubescent 3. *P. candicans*
   b. Leaves with petioles strongly flattened laterally, especially near the blade.
      (1) Leaves broadly ovate to orbicular, rounded or subcordate at the base, short pointed at the apex.
         (a) Margin of leaf coarsely undulate dentate 4. *P. grandidentata*
         (b) Margin of leaf finely crenulate all around 5. *P. tremuloides*
      (2) Leaves deltoid to rhombic-ovate, truncate or broadly cuneate at the base, abruptly acuminate at the apex.
         (a) Leaves broadly deltoid, truncate at the base, branches widely spreading, crown broad 6. *P. deltoides*
         (b) Leaves rhombic to rhombic-ovate, broadly wedge-shaped or rounded at the base, branches ascending to erect; crown narrower.
            x. Leaves rhombic, nearly as broad or broader than long, 3–7 cm.long, crown very narrow 7. *P. nigra* var. *italica*
            y. Leaves rhombic-ovate, longer than broad, 7–14 cm. long, crown pyramidal 8. ×*P. Eugenei*

1. Populus alba L. Sp. Pl. 1034. 1753.

SILVER-LEAF POPLAR

A round-topped tree, 10–25 m. high and 3–10 dm. in diameter; bark on young trees greenish white or gray, becoming dark brown and furrowed with age; leaf buds downy pubescent; young twigs white tomentose, at length becoming glabrous; leaves rhombic-oval or nearly orbicular, sometimes angular, truncate or subcordate at the base, acute at the apex, 4–10 cm. long, 3–8 cm. wide, densely white tomentose when young, becoming glabrous and dark green above, remaining white tomentose below, margin coarsely and irregularly sinuate dentate; petiole nearly round, tomentose, shorter than the blade; staminate catkins 3–6 cm. long, cylindrical, 10–14 mm. in diameter; stamens about 8; pistillate catkins 2.5–5 cm. long, narrowly cylindrical, becoming 5–7 cm. long in fruit; capsule ovoid, 2.5–3 mm. long, short-pedicelled, glabrous; style short; stigma with 2–3 narrow, filiform lobes. (*Alba*, white, referring to the leaves and bark.)

Cultivated and spreading extensively by the root. Introduced from Europe. Wood light, soft, weak, reddish yellow, sapwood nearly white. Flowers in April, fruit ripe in May.

1a. P. alba var. nivea (Willd.) Wesm. in DC. Prod. 16²: 324. 1868.

Leaves 3–5-lobed, maple-like, very white beneath. This is the commonest form in cultivation in the state. (*Nivea*, snowy, referring to the very white leaves.)

1b. P. alba var. **pyramidalis** Bunge; Al. Lehmann Rel. Bot. in Mem. prés à l'ac. de St. Pét. par div. sav. 7: 498. 1851.

P. alba var. *Bolleana* (Lauche) Wesm. 1887.

A narrow-topped tree, resembling the Lombardy poplar in habit but the leaves rather deeply 3–5-lobed and white-cottony beneath. (*Pyramidālis*, pyramidal, referring to the form of the tree.)

POPULUS ALBA POPULUS ALBA VAR. NIVEA

(Leaves ×½, Capsule ×2.)

2. Populus balsamifera L. Sp. Pl. 1034. 1753.*

BALSAM POPLAR, TACAMAHAC

P. tacamahacca Mill. 1768.

A tree 6–30 m. high, with a trunk diameter of 3–15 dm., bark gray or greenish, smooth or more or less furrowed and darker on old trunks; buds large and very resinous, young twigs light brown and lustrous, older twigs gray; leaves ovate-lanceolate to cordate-ovate, gradually tapering, acute or acuminate at the apex, rounded or subcordate at the base, 4–12 cm. long, 3–7 cm. wide, dark green, shining and glabrous above, pale and silvery beneath or often rusty due to the resinous secretion, reticulate veined, glabrous or sometimes puberulent along the veins, margin finely crenate; petiole round, shorter than the blades; stipules linear-lanceolate, early fugaceous; staminate catkins 3–5 cm. long, about 1 cm. in diameter, pistillate catkins 6–8 cm. long, slender, rather loose-flowered, becoming 12–15 cm. long in fruit, the rachis somewhat pubescent; capsule ovoid, glabrous, 7–9 mm.

* There can be no doubt that Linnaeus' original "*Populus balsamifera*" was a composite species made up in part of this species and in part of the southern form of the cottonwood. The name has been applied consistently for over a century to this species, and there seems to be no good reason for transferring it at this late date to the other portion of Linnaeus' aggregate as has been done recently by several authors. On the other hand, such a change always leads to confusion.

long, short-pedicelled; stigmas broad, irregularly lobed. (*Balsamífera*, balsam bearing, referring to the resinous buds and leaves.)

Grows generally along streams and in swamps but also in somewhat drier situations; common throughout the northern half of the state. Labrador to Alaska, south to western New England, Michigan, and Minnesota. Flowers in early May, fruit ripe in late May and June.

Wood light, soft, and weak, light brown, with nearly white sapwood. Used for pulp, boxes, pails, packing cases, etc.

POPULUS CANDICANS POPULUS BALSAMIFERA

(×⅔)

3. Populus candicans Ait. Hort. Kew. 3: 406. 1789.

BALM OF GILEAD

A large tree 15–25 m. high with an open, irregular crown and a trunk diameter of 3–15 dm.; bark of trunk gray, ridged; buds large, resinous, and very aromatic; young twigs sparingly pubescent, brownish, becoming smooth and lustrous; leaves cordate or broadly ovate, cordate at the base, apex acuminate, 8–16 cm. long, 6–12 cm. wide, dark green and glabrous above (sometimes slightly pubescent along the principal veins), pale and often rusty-tinged beneath, pubescent along the veins, margin crenulate, petiole long, rather stout, round, pubescent, stipules lanceolate, early deciduous; staminate catkins 3–6 cm. long, about 1 cm. thick; pistillate catkins 9–15 cm. long, slender, becoming 15–20 cm. long in fruit, rachis pubescent, scales lacerate, long silky pubescent, 6–8 mm. long; capsule ovoid, acute, glabrous, warty, 6–8 mm. long; pedicel about half as long as capsule, stigmas broad, much lobed. (*Cándicans*, whitish.)

Cultivated in the southern half of the state and occasionally escaping. Origin unknown. Flowers in April, fruit ripe in May.

4. Populus grandidentata Michx. Fl. Bor. Am. 2: 243. 1803.

LARGE-TOOTHED ASPEN

A medium-sized to large tree 10–20 m. high and 2-12 dm. in diameter; bark smooth, grayish or yellowish green, becoming furrowed and dark brown on the trunks of old trees; twigs more or less tomentose when young, later becoming smooth and gray or brownish; bud scales tomentose; leaves round ovate, acute or short acuminate at the apex, rounded or truncate at the base, 5–9 cm. long, 4–7.5 cm. wide, sometimes much larger on vigorous sprouts, densely white tomentose when young, becoming glabrous on both

POPULUS GRANDIDENTATA POPULUS TREMULOIDES

(Leaves ×½)

sides when mature, yellowish green, slightly paler beneath, margin coarsely undulate-toothed; petioles slender, slightly shorter than the blade, strongly flattened near the blade; stipules very early deciduous; staminate catkins 4–7 cm. long, about 1 cm. in diameter, scales irregularly 5–7 cleft, silky pubescent, stamens 6–12; pistillate catkins rather dense, 3–5 cm. long, becoming 10–15 cm. long in fruit, scales long-pubescent, capsule conical, about 5–6 mm. long, glabrous, slender-pedicelled, stigmas with 2–3 slender lobes. (*Grandidentáta*, large-toothed, referring to the leaf margin.)

In rich woods, common except in the southwestern and northeastern parts of the state. Nova Scotia west to Ontario and Minnesota, south to North Carolina and Iowa. Flowers in early May, fruit ripe in late May.

Wood weak, soft, light brown, with thin white sapwood; used for paper pulp, excelsior, and woodenware.

5. Populus tremuloides Michx. Fl. Bor. Am. 2: 243. 1803.

AMERICAN ASPEN, QUAKING ASP, TREMBLING POPLAR

A straight, slender tree, 6–20 m. high and 2–6 dm. in diameter; bark smooth, greenish white or gray, becoming furrowed and dark in older trees; twigs smooth, reddish brown the first year, later turning gray; bud scales smooth and shining; leaves broadly ovate or nearly orbicular, truncate or, more rarely, subcordate at the base, abruptly short acuminate at the apex, rounded, 2.5–5 cm. long, 2.3–5 cm. wide, or those of young trees and sprouts considerably larger, at first silky hairy, especially along the margin, entirely glabrous when mature, bluish or yellowish green, lower surface generally somewhat paler, margin evenly crenate-serrulate; petioles about as long as the blades, very slender and laterally flattened; staminate catkins 3–6 cm. long, less than 1 cm. thick, scales deeply 3–5 cleft, long silky hairy, stamens 6–12; pistillate catkins 3–6 cm. long, slender, scales deeply 3–5 cleft into linear segments, silky hairy, disk very oblique, capsule conical, about 5 mm. long, pedicel short, stigma lobes linear. (*Tremuloides*, resembling *P. tremula*, so called from the quivering habit of the leaves.)

In various situations, common throughout the state, most abundant in the north where it frequently occurs in nearly pure stands on logged or burnt-over areas. Labrador to Alaska, south to Pennsylvania, Maryland, Nebraska, and in the Rocky Mountains to Mexico. Flowers in early April, fruit ripe in May.

Wood soft and weak, light brown, with nearly white sapwood; used extensively for paper pulp and excelsior. The bark constitutes the principal food of the beaver.

6. Populus deltoides Marsh. Arb. Am. 106. 1785.

COTTONWOOD

P. balsamifera L. Sp. Pl. 1034 in part.

A large tree 15–30 m. high, and 4–20 dm. in diameter, bark at first smooth and grayish green, becoming dark gray and prominently ridged on the trunks of older trees; buds large, pointed, bud scales glabrous and very resinous; twigs stout, with prominent leaf scars, smooth, at first yellowish, later turning gray; leaves broadly deltoid, mostly long acuminate at the apex, truncate or broadly wedge-shaped or broadly cordate at the base, 4–10 cm. long, 4–10 cm. wide or sometimes slightly broader than long, at first resinous all over and more or less pubescent along the margin, soon glabrous, except for minute puberulence on the margin of the teeth, bright green on both surfaces, margin crenate-serrate, hyaline, thickened; petiole rather stout, about as long as the blade, strongly flattened; staminate catkins 6–12 cm. long or more, 1–1.5 cm. in diameter, scales lacerate-fringed, glabrous, stamens 30–60; pistillate catkins 6–10 cm. long, becoming 10–20 cm. long in fruit, scales glabrous, capsule ovoid, acute, 10–14 mm.

long, finely warty, 2–4-valved, pedicel 4–8 mm. long; stigmas broad and irregularly lobed. (*Deltoides*, triangular, referring to the leaf.)

Mostly on bottom-lands and along lake shores throughout the southern half of the state. Very extensively planted as a windbreak and shade tree around farmsteads of the prairie area. Western Quebec and New Hampshire to Alberta, south to Florida and Texas. Flowers in April, fruit ripe in early June.

Wood light, soft, brownish, with nearly white sapwood, warping badly while drying and difficult to split; used for boxes, paper pulp, firewood, and to some extent as lumber.

POPULUS DELTOIDES
(Leaves ×⅓)

7. Populus nigra L. var. **italica** Du Roi, Harbk. Baumz 2: 141. 1772.

LOMBARDY POPLAR

A tall pyramidal tree 15–25 m. high and 3–8 dm. in diameter, bark at first yellowish, later becoming gray, more or less ridged and dark brown on the trunks of old trees; branches strongly ascending, springing from all parts of the trunk; buds but slightly resinous; twigs slender, glabrous, yellowish, and shining; leaves rhombic-deltoid, cuneate to truncate at the base, short or long acuminate at the apex, 3–7 cm. long, 3–9 cm. wide, the larger ones generally broader than long, dull green above, slightly paler beneath, glabrous when mature, margin rather finely crenate-serrate; petioles flattened, shorter than the blades; staminate catkins 3–6 cm. long, scales lacerate-fringed, glabrous, stamens 6–30. All Lombardy poplars are staminate. (*Nigra*, black; *italica*, Italian, on account of its being one of the characteristic trees of some parts of Italy. It is probably a native of Asia.)

Extensively planted in many parts of the state but rather short-lived. It frequently becomes disfigured through winter killing of the top and main branches. Wood soft and weak, reddish brown with thick, nearly white sapwood; of little value and very little used.

POPULUS NIGRA VAR. ITALICA
(×½)

POPULUS EUGENEI

8. ×Populus Eugenei Simon-Louis Catal. ex Schneider, Ill. Handb. Laubholzk. 1: 9. 1904.

NORWAY POPLAR, SUDDEN SAWLOG

P. deltoides × *P. nigra* var. *italica.*

A very rapid-growing, upright tree with ascending branches, 15–25 m. high, 3–8 dm. in diameter; bark yellowish gray, becoming dark and somewhat ridged towards the base of the trunk, characteristically marked by crescent-shaped dark blotches of earlier leaf-scars, sometimes 1–2 dm. across and visible on the main trunk for many years; buds large and resinous; twigs somewhat angular, yellowish green, glabrous; leaves rhombic-ovate, long acuminate at the apex, broadly cuneate or rounded at the base, 7–14 cm. long, 5–9 cm. wide, glabrous, thick and leathery in texture, dull green above, slightly paler and with prominent veins beneath, margin crenate-serrate, the serrations prominently gland-tipped and incurved; petioles stout, strongly flattened near the blade, 2.5–5 cm. long. Only staminate trees, the catkins resembling those of the cottonwood. (*Eugénei*, named for the French florist, Eugene Simon.)

This tree is becoming extensively planted throughout the state and in the northwest generally, on account of its vigorous habit and very rapid growth, and hence the name "Sudden Sawlog." Bailey in his *Manual of Cultivated Plants* states that the Norway or Sudden Sawlog poplar of the Minnesota-Dakota region is apparently a form of *P. balsamifera* [*P. deltoides*] or a hybrid from it and that it was brought prominently to notice in 1904, having been distributed from a Norwegian settlement in Minnesota. He states further that it is supposed to be of Siberian origin. According to Schneider (*l.c.*) this hybrid first originated in the garden of Simon-Louis at Plantières near Metz. It is not known whether or not the common form in Minnesota is identical with the European form.

2. SALIX L. Sp. Pl. 1015. 1753.

WILLOW

Trees or shrubs, leaves alternate, simple, pinnately veined; buds with a single scale, not resinous; flowers in catkins with entire, usually hairy scales, dioecious, naked, fragrant, appearing before or with the leaves; staminate flower with 1–10, usually 2 stamens, with 1 or more nectar-bearing glands at the base; pistillate flower with a small gland at the base; ovary 1-celled, with 2 parietal placentas; stigmas 2, more or less 2-lobed; fruit a capsule; seeds hairy. (*Sálix*, the classical Latin name.)

A genus of 170 species, widely distributed throughout the north temperate and arctic zones. About 80 species occur in North America. Natural hybrids between the species of willows are extremely common but no attempt is made to describe hybrids in this treatment.

I. Catkins borne on short, more or less leafy lateral branchlets; mature capsules glabrous (except sometimes in S. *longifolia*).
  a. Scales of pistillate catkins yellow, falling before the catkins are ripe; filaments of stamens hairy below.
    (1) Stamens mostly 3–5, sometimes more, leaf margins serrate or serrulate.
      (a) Native trees becoming over 7 m. high; pistillate catkins slender and loose.
        m. Leaves ovate-lanceolate, whitish beneath 1. *S. amygdaloides*
        n. Leaves narrowly lanceolate, green beneath 2. *S. nigra*
      (b) Shrubs, pistillate catkins thick, short, and dense.
        m. Leaves green on both surfaces, margins serrate; fruit ripe in early summer.
          x. Leaves ovate-lanceolate long acuminate, shining on both surfaces; capsule conic-ovoid; native 3. *S. lucida*
          y. Leaves ovate or oblong-ovate, somewhat paler beneath, acute or short acuminate; capsule conic-subulate; cultivated 4. *S. pentandra*
        n. Leaves glaucous or white beneath, margin finely serrulate; fruit ripe in autumn 5. *S. serissima*
    (2) Stamens 2.
      (a) Native shrub, leaves linear, very distantly toothed 6. *S. longifolia*
      (b) Commonly cultivated trees, leaves lanceolate, finely to coarsely serrate.
        m. Branchlets very slender and pendent (weeping willow) 7. *S. babylonica*
        n. Branchlets stouter, more or less ascending.
          x. Branches very brittle at the base; leaves essentially glabrous; capsules long, conic-lanceolate, pedicelled 8. *S. fragilis*
          y. Branches not very brittle; leaves silky when young; capsules, short, ovoid, sessile 9. *S. alba*
  b. Scales of pistillate catkins brownish to black (except in *S. Bebbiana*), persistent; stamens 2, filaments glabrous, leaves whitish beneath.
    (1) Low bog-loving shrub; leaves entire, elliptic to oblanceolate, 3–6 cm. long, very finely reticulate; scales glabrous 10. *S. pedicellaris* var. *hypoglauca*

(2) Taller shrubs of stream and lake margins; leaves serrate, lanceolate to ovate, generally more than 7 cm. long; scales villous.

(a) Branchlets red, shining, glabrous; petioles slender, 1–2 cm. long; stipules wanting; blades short oval to oblong-lanceolate, glaucous and prominently reticulate-veined beneath, slightly glandular-serrulate 11. *S. pyrifolia*

(b) Branchlets brownish or yellowish, dull, the younger pubescent; petioles stoutish, 1 cm. long or less; stipules usually large on vegetative shoots; blades lanceolate, closely serrate or serrulate.

m. Young twigs and bud scales puberulent to pubescent; leaf blades pale or whitish beneath; fruiting catkins up to 5–6 cm. long; capsules 5–7 mm. long 12. *S. cordata*

n. Young twigs and bud scales usually pubescent to villous; blades glaucous beneath; fruiting catkins up to 10 cm. long; capsules 8–10 mm. long 13. *S. missouriensis*

II. Catkins appearing with the leaves, sessile or short-stalked, naked or with a few leafy bracts at the base which do not develop into ordinary foliage leaves; mature capsules pubescent (except in *S. cordata* and *S. missouriensis*).

a. Mature capsules glabrous; leaves closely serrate or serrulate.

(1) Young twigs and bud scales puberulent to pubescent; leaf blades pale or whitish beneath; fruiting aments up to 5–6 cm. long; capsules 5–7 mm. long 12. *S. cordata*

(2) Young twigs and bud scales usually pubescent to villous; blades glaucous beneath; fruiting aments up to 10 cm. long; capsules 8–10 mm. long 13. *S. missouriensis*

b. Mature capsules pubescent; catkins appearing before or with the leaves.

(1) Leaves closely serrate, lanceolate, acuminate 14. *S. petiolaris*

(2) Leaves entire or only remotely and irregularly crenate-serrulate.

(a) Low shrubs of bogs or cold wet places.

m. Leaves narrowly lanceolate or oblanceolate, rugose above.

x. Leaves densely white woolly beneath 15. *S. candida*

y. Leaves nearly glabrate beneath 15a. *S. candida* var. *denudata*

n. Leaves narrowly to broadly elliptical or ovate.

x. Leaves bright green, very thinly sericeous beneath; capsules sessile 16. *S. planifolia*

y. Leaves gray, rugose and densely pubescent beneath; capsule long-pedicelled 17. *S. Bebbiana*

(b) Tall shrubs or, if low, then in drier places.

m. Leaves elliptical or broadly elliptical to ovate, margins distantly and irregularly crenate-serrate.

r. Leaves rugose and densely pubescent beneath; capsule long-pedicelled; scales yellow 17. *S. Bebbiana*

s. Leaves glabrous or thinly pubescent beneath; capsule short-pedicelled; scales black.

x. Branchlets and leaves glabrous.

(x) Leaves short lanceolate to elliptic or elliptic-oblanceolate 18. *S. discolor*

(y) Leaves broadly elliptic to oval or broadly ovate 18a. *S. discolor* var. *Overi*

y. Branchlets tomentose; leaves thinly pubescent beneath
18b. *S. discolor* var. *eriocephala*

n. Leaves narrowly to broadly oblanceolate, pubescent beneath, margins entire, revolute.

r. Leaves 4–10 cm. long; mature aments 2–4 cm. long.

x Leaves narrowly elliptical or oblanceolate 19. *S. humilis*

y Leaves broadly oblanceolate to obovate
19a. *S. humilis* var. *keweenawensis*

s. Leaves 2–5 cm. long; mature aments 1–2 cm. long 20. *S. tristis*

1. Salix amygdaloides Anders. Ofv. Handl. Vet. Akad. 114. 1858.

PEACH-LEAVED WILLOW

A medium-sized to large tree 12–30 m. high, with a trunk diameter of 2–6 dm.; dark brown, ridged and more or less scaly; leaves lanceolate to

SALIX AMYGDALOIDES SALIX PENTANDRA SALIX NIGRA
(Leaves ×⅔, Capsules ×2)

ovate-lanceolate, 6–12 cm. long, 1.5–2.5 cm. wide, narrowed or rounded at the base, long acuminate at the apex, finely serrate, at first pubescent, glabrate in age, dark green above, whitish beneath; petiole slender, 1–3 cm. long; stipules minute, early deciduous except occasionally on strong sterile

shoots; catkins appearing with the leaves on short leafy peduncles; staminate catkins 3–7 cm. long, stamens 5 or more; pistillate catkins 4–10 cm. long, becoming very loose in fruit; scales early deciduous, capsule globose-conical, glabrous, 4–6 mm. long, slender-pedicelled; stigmas nearly sessile, faintly lobed. (*Amydaloides*, almond-like, referring to the form of leaf.)

Frequent along streams, in moist or low places throughout the state except in the coniferous forest area. Western Quebec and New York to British Columbia, south to Ohio, Missouri, and New Mexico.

2. Salix nigra Marsh. Arb. Am. 139. 1785.

BLACK WILLOW

A tree 10–20 m. high, or sometimes only a shrub, bark on trunk thick, rough, and flaky, dark brown to nearly black; young twigs green and generally pubescent or puberulent, becoming dark brown and glabrous with age, brittle at the base; leaves narrowly lanceolate, very long attenuate from the rounded or narrowed base to the tip, frequently falcate, 6–15 cm. long, 5–18 mm. wide, closely serrulate with incurved teeth, often pubescent when young, green and glabrous above when mature, slightly paler and sometimes pubescent along the veins beneath; petioles 2–6 mm. long, pubescent; stipules either large, semicordate and pointed, or else small and ovate, persistent or deciduous; catkins appearing with the leaves, on short leafy shoots; staminate catkins 3–5 cm. long, 6–8 mm. in diameter, stamens 3–7, filaments hairy; pistillate catkins 4–8 cm. long, 5–6 mm. in diameter, generally loose; scales ovate, early deciduous, densely soft pubescent, capsules ovoid-conical, rounded at the base, glabrous, 3–5 mm. long, pedicels slender, spreading, 1–2 mm. long, style very short, undivided, stigmas unlobed. (*Nigra*, black, referring perhaps to the dark appearance of the foliage in mass.)

Along banks of streams and lakes, infrequent along the southeastern border and as far north as Taylor's Falls, and the vicinity of Aitkin. New Brunswick to Minnesota, south to Florida and Texas.

3. Salix lucida Muhl. Neue Schrift. Ges. Nat. Fr. Berlin, 4: 239. 1803.

SHINING WILLOW

A shrub 2–5 m. high; bark smooth or somewhat scaly; twigs yellowish brown and glossy; leaves ovate-lanceolate, 6–12 cm. long, 2–3.5 cm. wide, rounded at the base, long acuminate at the apex, finely and evenly serrate, thick, coriaceous, glabrous, green and glossy on both sides or sparingly rusty pubescent when very young; petioles stout, glandular at the top; stipules commonly persistent, semicordate to reniform; catkins appearing with the leaves, on short leafy branches; staminate catkins stout, golden

yellow, 2–3 cm. long, stamens about 5, filaments pubescent below; pistillate catkins 2–3.5 cm. long, narrower than the staminate, becoming 3–4 cm. long in fruit; scales prominent, pale, more or less erose, hairy on the back, deciduous, capsules rounded at the base, long-beaked, 4.5–6.5 mm. long, pedicels 1–1.5 mm. long, style about 1 mm. long, stigmas slightly lobed. (*Lúcida*, shining, referring to the shining leaves and twigs.)

Common along banks of streams, roadside ditches, and edges of meadows throughout the southern half of the state, less frequent northwestward. Newfoundland to Manitoba south to Pennsylvania, Illinois, and Nebraska.

4. **Salix pentandra** L. Sp. Pl. 1016. 1753.

BAY-LEAVED WILLOW, LAUREL-LEAVED WILLOW

Shrub or small tree 1.5–10 m. high; bark of old trunks gray and furrowed; twigs shining, yellowish green or reddish brown, more or less resinous or gummy when young; leaves elliptic, ovate, or oblong-ovate, 5–12 cm. long, 1.5–4 cm. wide, mostly rounded at the base, acute or acuminate at the apex, finely and closely glandular serrate; glabrous, bright green and shining above, slightly paler beneath, becoming leathery; petiole glandular, 5–15 mm. long; stipules generally reduced to a pair of glands; catkins appearing with the leaves, on short leafy branches; staminate catkins 2.5–5 cm. long, 1–1.5 cm. thick, stamens mostly 5 (sometimes more), filaments pubescent below; pistillate catkins 2–6.5 cm. long, 7–12 mm. thick; scales conspicuous, oblong, pubescent, especially towards the base, deciduous, capsules long-conic, 5–7 mm. long, cordate at the base, straw-color or brown, lustrous, pedicels very short, style 2-cleft, stigmas 2-lobed. (*Pentándra*, referring to the five-stamened flowers.)

Frequently cultivated on account of the glossy foliage. Native of Europe and northern Asia.

5. **Salix serissima** (Bailey) Fernald, Rhodora, 6: 6. 1906.

AUTUMN WILLOW

A shrub, 2–4 m. high, bark brown and shining; leaves elliptic-lanceolate, 4–8 cm. long, 1–3 cm. wide, narrowed and glandular at the base, somewhat acuminate at the apex, very finely serrulate, dark green and shining above, whitish or glaucous beneath, glabrous, coriaceous when mature; petioles about 1 cm. long; stipules early deciduous; catkins appearing with the leaves, on short, leafy twigs; staminate catkins 2–4 cm. long, stamens 5 or more; pistillate catkins 2–3.5 cm. long, becoming 3–5 cm. long in fruit; scales pale, hairy, early deciduous, capsule conic-subulate, 7–10 mm. long, brown, becoming straw-colored and indurated at maturity, ripe in late summer; pedicels rather stout, 1–2 mm. long; style short and thick; branches of stigmas scarcely lobed. (*Seríssima*, latest, referring to the late fruiting habit.)

In bogs and swamps, occurring mostly on calcareous soil throughout the northern half of the state but not common. Quebec to New Jersey, west to Alberta and Minnesota.

SALIX SERISSIMA SALIX LUCIDA SALIX LONGIFOLIA
(Leaves ×⅔, Capsules ×2)

6. Salix longifolia Muhl. Neue Schrift. Ges. Nat. Fr. Berlin, 4: 238. 1803.

SANDBAR WILLOW

S. fluviatilis of many authors including Minn. T. and S. 1912, not of Nutt. *S. interior* Rowlee, 1900.

A shrub with clustered stems 1.5–4 m. high; bark smooth and gray; twigs reddish brown and usually glabrous; leaves linear to linear-lanceolate, 5–12 cm. long, 5–12 mm. wide, narrowed to the base, acute at the apex, remotely denticulate, thinly silky pubescent when young, glabrous in age, green on both sides; petiole very short; stipules mostly lacking; catkins appearing with and after the leaves, mostly in June; staminate catkins clustered at the tips of slender branches, 1.5–3 cm. long, 5–8 mm. wide, stamens 2, filaments pubescent at the base; pistillate catkins solitary, at the ends of rather long leafy shoots, which proliferate from the axils of the upper

leaves, 2.5–4 cm. long, very loose-flowered; scales pale, slightly pubescent, very early deciduous, capsules rounded at the base, long-beaked, 4–5 mm. long, somewhat strigose, pedicel up to 1 mm. long, stigmas large, sessile, deeply lobed. (*Longifólia*, long-leaved.)

Abundant throughout the state but commonest south, chiefly on sand bars and sandy shores of lakes. Quebec to Manitoba, south to Delaware and Louisiana. Sometimes planted as a windbreak but objectionable on account of its tendency to spread by the roots.

7. Salix babylonica L. Sp. Pl. 1017. 1753.

WEEPING WILLOW

A large tree attaining a height of 20 m. and a trunk diameter of 1.5 m., generally considerably smaller; bark gray and rough; twigs slender, elongated, and drooping, yellowish green; leaves narrowly lanceolate, 6–15 cm. long, 8–15 mm. wide (those of the catkin-bearing twigs much smaller), narrowed at the base, long acuminate at the apex, finely and evenly serrate, sparsely pubescent when young, soon becoming glabrous, green above, paler beneath; petioles 3–15 mm. long; stipules narrowly lanceolate, falling early; catkins appearing with the leaves on short leafy twigs; staminate catkins 1.5–3 cm. long, cylindrical, stamens 2; pistillate catkins 1–2 cm. long, less than 5 mm. in diameter, becoming 3–4 cm. long in fruit; scales ovate, acute, somewhat pubescent, early deciduous, capsules ovoid, sessile, 1–1.5 mm. long, stigmas deeply lobed, almost sessile. (*Babylónica*, pertaining to Babylon.)

Native of Asia; cultivated to some extent in the state but seldom pure in cultivation. The weeping willow most commonly planted in the northwest is the following hybrid.

7a. ×Salix pendulina Wender. Schrift. Nat. Ges. Marburg, 2: 235. 1831.

WISCONSIN WEEPING WILLOW

S. babylonica×*fragilis*.
S. blanda Anders.

Differs from pure *S. babylonica* in the somewhat wider leaves, in having 2 nectaries or glands instead of 1 at the base of the pistillate flower and in the longer pedicel of the capsule. (*Pendulína*, pendulous.)

In the trade generally passing as true *S. babylonica*. The "Niobe Weeping Willow" is of doubtful parentage (see note under *S. alba* var. *vitellina*).

8. Salix fragilis L. Sp. Pl. 1017. 1753.

CRACK WILLOW

A medium-sized to tall tree 10–20 m. high with a trunk diameter up to 1.5 m.; bark at first brownish and rather smooth, later becoming dark gray and flaky; twigs dull green, very brittle at the base; leaves lanceolate, 7–15 cm. long, 2–2.5 cm. wide, narrowed at the base, long acuminate at the apex, rather coarsely undulate-serrate, dark green above, somewhat paler beneath, essentially glabrous even when young; petiole 1–1.5 cm. long, slightly glandular; stipules minute and fugaceous; catkins appearing with the leaves on short leafy twigs; staminate catkins 4–6 cm. long, stamens 2;

pistillate catkins 4–6 cm. long, narrow, loose-flowered, becoming 6–8 cm. long in fruit; scales deciduous, capsules long-conic, glabrous, 4–5 mm. long, short-pedicelled, stigmas nearly sessile, distinctly 2-lobed. (*Frágilis*, fragile, referring to the brittle twigs.)

A European tree, very extensively planted and becoming naturalized especially throughout the southern half of the state; the most frequently planted willow. Hybridizes freely with *S. alba*.

SALIX FRAGILIS SALIX ALBA SALIX BABYLONICA

(Leaves ×⅔, capsules ×2)

9. Salix alba L. Sp. Pl. 1021. 1753.

WHITE WILLOW

A medium-sized to large tree 6–25 m. high, with a trunk-diameter of 4–10 dm.; bark gray, rough; twigs green to olive-brown; leaves oblong-lanceolate to lanceolate, 6–12 cm. long, 1.5–2.5 cm. wide, narrowed at the base, acuminate at the apex, serrulate, green above, much paler beneath, silky pubescent, in the typical form remaining pubescent even in maturity; petiole 5–10 mm. long, slightly glandular; stipules lanceolate, early deciduous; catkins on short, leafy shoots, appearing with the leaves; staminate catkins 3–4 cm. long, stamens 2; pistillate catkins 3.5–6 cm. long, very slender, loose-flowered; scales finally deciduous, capsule ovoid, 3–4 mm. long, glabrous, almost sessile, stigmas nearly sessile, 2-lobed. (*Alba*, white, referring to the pale hairs.)

A European tree, occasionally planted in the typical form, more frequently in the following variety.

9a. S. alba L. var. **vitellina** (L.) Ser. Ess. Saule, Suisse, 83. 1815.

GOLDEN WILLOW

Twigs yellow or reddish, mature leaves glabrous, white beneath. A large tree of rapid growth, valuable for windbreaks. (*Vitellina*, like the yolk of eggs, referring to the color of the twigs.)

The form *pendula* of this variety is sometimes planted as a "Weeping Willow" and is probably the "Niobe Weeping Willow" of horticulturists. The long drooping twigs are more yellow than those of the true weeping willow (*S. babylonica*).

10. Salix pedicellaris Pursh. var. **hypoglauca** Fernald, Rhodora, 11: 161. 1909.

BOG WILLOW

A low, more or less erect shrub 3–10 dm. high; bark grayish or light brown on young twigs; leaves obovate-oblong or broadly oblanceolate 1.5–6 cm. long, 6–19 mm. broad, narrowed or rounded at the base, obtuse or subacute at the apex, with entire revolute margin, reticulate-veined and subcoriaceous when mature, glabrous, bright green above, glaucous beneath; petioles 2–5 mm. long, not glandular; stipules deciduous; catkins on leafy peduncles, expanding with the leaves; staminate catkins 1.5–2 cm. long, stamens 2; pistillate catkins 1.5–2.5 cm. long, becoming longer in fruit, rather loosely flowered; scales greenish yellow, persistent, villous towards the apex or glabrate, capsules oblong-conic, obtuse, 4–6 mm. long, reddish, pedicels slender, about twice the length of the scales, style short, about the length of the stigma. (*Pedicellāris*, referring to the distinctly pedicelled capsules; *hypoglaúca*, to the glaucous under-surface of the leaf.)

Common in bogs and wet meadows throughout the northern half of the state, infrequent or rare southward to Blue Earth County. Eastern Quebec to British Columbia, south to New Jersey, Pennsylvania, Illinois, and Iowa.

The true *S. pedicellaris* Pursh differs in having the leaves deep green on both surfaces. Its range lies mainly to the north of the preceding and it probably does not reach the borders of the state.

11. Salix pyrifolia Anders. Sw. Vet. Acad. Handl. 6[1]: 162. 1867.

BALSAM WILLOW

S. cordata β balsamifera Hook. Fl. Bor. Am. 2: 149. 1839.
S. balsamifera Baratt ex Hook. loc. cit., as synonym.

A shrub 2–3 m. high, much branched; twigs reddish brown or dark olive, glabrous and shining; leaves oval to oblong-lanceolate or lanceolate, 2.5–8 cm. long, 1.5–4 cm. wide, rounded or subcordate at the base, acute or short acuminate at the apex, slightly glandular serrate, very thin at first and pubescent beneath later becoming firm in texture, dark green above, paler

and glaucous beneath and prominently reticulately veined; petiole slender, 8–15 mm. long; stipules minute, early deciduous; catkins on leafy peduncles, staminate catkins 2–3 cm. long, pistillate catkins 3–5 cm. long, becoming lax in fruit, and 6–8 cm. long; scales pubescent, persistent; capsules narrowly conic, long-beaked, 8–10 mm. long, glabrous, pedicels very slender, 2.5–3.5 mm. long, exceeding the scales, style short, stigmas distinctly 2-lobed. (*Pyrifólia*, with leaves like a pear tree.)

Infrequent, mostly in tamarack-spruce swamps from the central to the northeastern parts of the state. Newfoundland and Labrador to Mackenzie and British Columbia, southward to New England, New York, Michigan, and central Minnesota

SALIX PEDICELLARIS SALIX PYRIFOLIA SALIX CORDATA

(Leaves ×⅔, Capsules ×2)

12. Salix cordata Muhl. Neue Schrift. Ges. Nat. Fr. Berlin, 4: 236. 1803.

HEART-LEAVED WILLOW

A shrub 2–4 m. high; twigs grayish green or brown, sometimes glabrous and shining; mature leaves oblong-lanceolate or narrowly lanceolate, 4–12 cm. long, 1–4 cm. wide, rounded or cordate at the base on vigorous shoots,

often narrowed or tapering on flowering shoots, acuminate at the apex, sharply serrulate, glabrous, dark green above, frequently paler beneath; petiole 1–2.5 cm. long; stipules ovate or reniform, somewhat oblique, serrulate, usually large and persistent on strong sterile shoots; catkins on mostly leafy peduncles (rarely without leaves), the rachis pubescent; staminate catkins 2–3.5 cm. long, stamens 2; pistillate catkins slender, 3–4 cm. long, becoming 4–6 cm. long in fruit; scales generally very pubescent, persistent, capsule narrowly ovoid, glabrous, 4–5 mm. long, short-pedicelled, style short, stigmas entire, obscurely lobed. (*Cordáta*, heart-shaped, referring to the leaf base.)

In wet places along streams and ditches, frequent throughout the state. New Brunswick to British Columbia, south to Virginia, Missouri, Colorado, and California.

13. Salix missouriensis Bebb. Gard. & For. 8: 373. 1895.

MISSOURI WILLOW

A shrub or small tree 3–12 m. high; bark dark brown or black; one-year-old twigs brownish gray, pubescent or tomentose; bud scales densely tomentose; leaves lanceolate to obovate-oblong or oblanceolate, 6–12 cm. long, 1.5–3.5 cm. wide, rounded at the base, more or less abruptly so in the broader leaves, acuminate at the apex, sharply serrate, bright green above, pale and glaucous beneath, more or less pubescent above along the midvein and the lowermost lateral veins, glabrous below except along the lower portion of the midvein; petiole 8–15 mm. long, pubescent; stipules semicordate to semiovate, conspicuous on strong sterile shoots; catkins mostly with few to several small leaves and a prominent coma of long white hairs at the base; staminate catkins 2–3 cm. long, slender, stamens 2; pistillate catkins 2–3 cm. long, becoming 6–8 cm. long in fruit, scales persistent, pilose, capsule narrowly ovoid, 7–8 mm. long, long-beaked, pedicel slender, about twice the length of the scales, style short, stigmas obscurely lobed. (*Missouriénsis*, referring to type locality on the Missouri River.)

In low ground, apparently confined to the southwestern part of the state, infrequent except possibly in the region of Big Stone Lake and Lake Traverse. Minnesota and North Dakota south to Missouri and Oklahoma.

14. Salix petiolaris J. E. Smith, Trans. Linn. Soc. 6: 122. 1802.

SLENDER WILLOW

A low, much branched shrub 1–3 m. high, with slender, dark brown or purplish, glabrous to puberulent twigs; leaves narrowly lanceolate, 3–9 cm. long, 6–12 mm. wide, narrowed or rounded at the base, acuminate at the apex, finely and evenly serrate with a cartilaginous margin, bright green above, paler and somewhat glaucous beneath, silky pubescent when young,

usually becoming glabrate and finely reticulate on both sides in age; petiole 6–12 mm. long; stipules minute, deciduous; catkins appearing with or slightly before the leaves, peduncles with few to several bract-like leaves; staminate catkins obovoid, 1.3–1.8 cm. long, stamens 2; pistillate catkins cylindrical 1–2 cm. long, becoming 2–3.5 cm. long in fruit, rather loose, scales persistent, pubescent, capsule conic-ovoid, short silky pubescent, sometimes becoming glabrate, 5–7 mm. long, pedicel slender, 1.5–3 mm. ong, stigmas nearly sessile, rather deeply lobed. (*Petiolāris*, petioled.)

Wet ground, throughout the state, more frequent northward. New Brunswick to Manitoba, south to Tennessee.

SALIX BEBBIANA SALIX PETIOLARIS SALIX CANDIDA

(Leaves ×⅔, capsules ×2)

15. Salix candida Fluegge, Willd. Sp. Pl. 4: 708. 1806.

HOARY WILLOW, SAGE WILLOW

A shrub, 0.5–2 m. high; young twigs white tomentose, older twig yellowish or light brown; leaves oblong-lanceolate to linear-lanceolate 4–12 cm. long, 5–17 mm. wide, narrowed at the base, acute at the apex or obtuse in some of the lowermost ones, nearly or quite entire with a revolute margin, rather firm in texture, dark green, dull and slightly tomentose or glabrescent above with impressed veins, densely white tomentose beneath; petiole 3–4 mm. long, tomentose; stipules lanceolate to ovate, about equalling the petiole; catkins with a few bract-like leaves at the base, appearing with the leaves; staminate catkins ovoid, 1–2 cm. long, scales

very long-pilose, anthers red, stamens 2; pistillate catkins cylindrical, 1–2 cm. long, becoming 2.5–5 cm. long in fruit; scales persistent, pilose, capsule ovoid-conic, densely white tomentose, 5–7 mm. long, pedicel 0.5 mm. long, style about 1 mm. long, stigmas rather distinctly 2-lobed. (*Cándida*, white, referring to the white tomentose leaves.)

Frequent in bogs and swamps, most abundant throughout the northern half of the state, less common southward. Newfoundland to Labrador and Athabasca, south to New Jersey, Pennsylvania, Ohio, Iowa, and South Dakota.

15a. S. candida var. **denudata** Anders. in DC. Prod. 16²: 278. 1868.

Leaves narrower, dark green and glabrate above, sparingly pubescent or glabrate and pale beneath. (*Denudáta*, bare.)

Appears to be limited to the northeastern part of the state. Gaspé County, Quebec, to Minnesota and south to Connecticut, New Jersey, and Wisconsin.

16. Salix planifolia Pursh, Fl. Am. Sept. 2: 611. 1814.

A much-branched shrub 1–3 m. high; twigs purplish, glabrous, and sometimes glaucous; leaves elliptic-lanceolate, 2–4 cm. long, 6–15 mm. wide, narrowed at the base, acute or sometimes rounded at the apex, margin remotely and minutely repand-toothed or slightly crenate, upper surface at first somewhat rusty pubescent, in age becoming glabrous and shining, lower surface much paler, at first white or rusty sericeous, later generally becoming glabrous and glaucous; petiole 2–4 mm. long; stipules minute, fugaceous; catkins with a few leafy bracts at the base, appearing with the leaves; staminate catkins elliptical, about 1.5 cm. long; pistillate catkins cylindrical 2.5–3.5 cm. long, becoming 3.5–5 cm. long in fruit; scales persistent, silvery hairy, capsule conical with an ovate base, 4–6.5 mm. long, short white pubescent, sessile or very short-pedicelled, style 1–2 mm. long, stigmas deeply cleft, lobes cylindrical. (*Planifólia*, flat-leaved.)

North shore of Lake Superior. Labrador to Alaska, south in the mountains to northern New England.

17. Salix Bebbiana Sarg. Gard. & For. 8: 463. 1895.

BEAKED WILLOW, BEBB'S WILLOW

S. rostrata Richards. 1823. (Not *S. rostrata* Thuill. 1797.)

A shrub 2–6 m. high, or sometimes a small tree up to 9 m. high, with one to few stems; young twigs brownish, covered with a gray, crisped puberulence, older twigs brown, often with a reddish tinge; leaves obovate to elliptic-oblanceolate, 3–7 cm. long, 1.5–2.5 cm. wide, narrowed or sometimes slightly rounded at the base, acute to short acuminate at the apex, margin entire to sparingly crenate-serrate, somewhat revolute, upper sur-

face dull green and finely pubescent or puberulent, lower surface grayish green and pubescent or puberulent with prominent reticulate veins; petiole about 0.5–1 cm. long; stipules semicordate, deciduous; catkins sessile, with a few leafy bracts at the base, expanding with or before the leaves; staminate catkins 2–4 cm. long, narrowly cylindrical, very hairy; pistillate catkins 2–4 cm. long becoming 4–8 cm. long in fruit; scales persistent, with a dark gray pubescence, capsule tapering from a broad oval base into a long, slender beak, pubescent, about 7 mm. long, pedicel slender, 2–4 mm. long, style very short, stigmas entire or deeply parted. (*Bebbiána*, named for M. S. Bebb, a distinguished student of willows.)

Frequent in moist and dry ground throughout the state. Newfoundland to Alaska, south to New Jersey, Nebraska, and Utah.

SALIX MISSOURIENSIS SALIX DISCOLOR

(Leaves ×¾, capsules ×2)

18. Salix discolor Muhl. Neue Schrift. Ges. Nat. Fr. Berlin, 4: 234. 1803.
PUSSY WILLOW, GLAUCOUS WILLOW

A tall shrub or small tree 2–8 m. high, with a trunk up to 2.5 dm. in diameter; bark dark gray, somewhat scaly; twigs light to dark brown,

glabrous or sometimes gray pubescent; buds large with a glossy scale; leaves elliptic, oblong-lanceolate, or oblanceolate, 5–12 cm. long, 1.5–3 cm. wide, mostly narrowed towards the base, acute at the apex, irregularly crenate-serrate, bright green and glabrous above, pale and glaucous beneath or sometimes pubescent when young; petiole 6–15 mm. long, more or less pubescent; stipules semicordate or oblique lanceolate, usually deciduous; catkins appearing before the leaves in earliest spring; staminate catkins thick cylindrical, mostly sessile, naked, 2.5–4 cm. long, dense, with copious long, silky hairs; pistillate catkins sessile or with a few small bract-like leaves on the peduncles, cylindrical, 2–4 cm. long, becoming 4–6 cm. long in fruit; scales persistent, long silky hairy, capsule narrowly conic, 5–6 mm. long, tomentose, pedicels slender, shorter than the scales, styles short, stigmas prominently lobed. (*Díscolor*, referring to the contrast in color between the upper and lower surfaces of the leaf.)

Common along streams and in moist situations throughout the state. Nova Scotia to Saskatchewan, south to Delaware and Missouri.

18a. S. discolor var. **Overi** Ball, Rhodora, 26: 137. 1924.

Leaves broadly elliptical to oval or broadly obovate, 4–7 cm. long, 2.5–4.5 cm. wide. (*Óveri*, named for W. H. Over.)

In the region of Big Stone Lake, South Dakota and Minnesota.

18b. S. discolor var. **eriocephala** (Michx.) Anders. in DC. Prod. 16²: 225. 1868.

This differs from the species in the somewhat densely pubescent twigs and bud scales, thicker and more lanceolate leaves, usually more or less persistently pubescent beneath, and in the more densely silky pubescent catkins. (*Eriocéphala*, woolly-headed.)

Range, same as that of the species.

19. Salix humilis Marsh. Arb. Am. 140. 1785.

PRAIRIE WILLOW

A shrub with clustered stems 0.5–3 m. high; young twigs hoary with a gray tomentum, older twigs yellowish to brown, more or less puberulent or glabrate; leaves oblong-lanceolate to oblanceolate, 4–10 cm. long, 8–25 mm. broad, mostly narrowed at the base, acute or abruptly short acuminate at the apex, margin revolute, undulate, entire or with a few minute appressed teeth, upper surface bright green, glabrate except along the midrib, lower surface pale tomentose with rather prominent reticulate veins; petiole 2–8 mm. long; stipules oblique lanceolate; catkins appearing before the leaves, naked or with a few small bracts; staminate catkins ovoid-cylindrical,

1–1.5 cm. long; pistillate catkins ovoid 1.5–2 cm. long, becoming 2–4 cm. long in fruit, fruit ripening almost before the foliage appears; scales persistent, with long silky pubescence, capsule long-conical, 8–9 mm. long, tomentose, pedicel about the length of the scale, style very short, lobes of the stigma not cleft. (*Húmilis*, low, referring to its frequently dwarf habit.)

Dry, sandy plains, jack-pine barrens, etc. Common in the eastern half of the state, rare westward. Newfoundland to Minnesota southward to North Carolina.

19a. S. humilis var. keweenawensis Farwell, Mich. Acad. Sc. Ann. Rep. 6: 206. 1904.

Differs in having broadish obovate leaves with a satiny or lustrous velvety pubescence. (*Keweenawénsis*, named from its type locality, the Keweenaw peninsula.)

Northeastern Minnesota and the upper peninsula of Michigan.

SALIX PLANIFOLIA SALIX HUMILIS SALIX TRISTIS

(Leaves ×⅔, capsules ×2)

20. Salix tristis Ait. Hort. Kew. 3: 393. 1789.

DWARF GRAY WILLOW, SAGE WILLOW

A low shrub with numerous stems, 0.4–1 m. high; young twigs dingy puberulent, older twigs dark yellow-brown and glabrate; leaves crowded, narrowly oblanceolate to linear-lanceolate, 2–5 cm. long, 5–12 mm. wide, narrowed at the base, obtuse or acute at the apex, entire with a revolute margin, green and more or less pubescent above, densely white-tomentose beneath; petiole about 1 mm. long; stipules minute, deciduous; catkins appearing before the leaves; staminate catkins elliptical or almost globular,

0.5–1 cm. long; pistillate catkins short elliptical, 4–10 mm. long, becoming 15–20 mm. long in fruit; scales persistent, long hairy, capsule 5–6 mm. long, narrowly conic, with a rounded base and long, slender beak, pedicel about the length of the scale, style about 0.5 mm. long, stigma lobed, deeply cleft or nearly entire. (*Tristis,* sad, from the dark-colored twigs.)

Dry sandy habitats in the eastern part of the state. New England to Minnesota, south to Florida, Tennessee, and Nebraska.

Staminate and Pistillate Flowers of Juglans cinerea

JUGLANDACEAE WALNUT FAMILY

Trees with alternate, pinnately compound leaves, stipules lacking; flowers monoecious, the staminate in catkins, the pistillate solitary, or 2–3

JUGLANS NIGRA

together in a cluster or spike; staminate flowers consisting of 3–many stamens and an irregular perianth, adnate to the bract; pistillate flower mostly with a 4-lobed regular perianth (sometimes 1–3, or all segments lacking) adherent to the ovary; pistil consisting of 2 carpels; ovule 1, basal; styles 2;fruit a kind of drupe with dehiscent or indehiscent exocarp enclosing the bony endocarp (nut shell); nut incompletely 2–4-celled; seed solitary, 2–4-lobed, the cotyledons very much corrugated.

A family of 6 genera and about 40 species, mostly of the north temperate zone.

1. Husk indehiscent, nut rugose, pith of twigs chambered 1. *Juglans*
2. Husk splitting into segments, nut smooth or angled, pith not chambered 2. *Carya*

1. JUGLANS L. Sp. Pl. 997. 1753.

WALNUT

Trees with spreading branches; bark fragrant; buds superposed; twigs with dark, chambered pith; leaves compound, odd-pinnate; staminate flowers in drooping, cylindrical catkins, borne on the twigs of the previous year; stamens 8–40, subtended by a bract and a 3–6-parted perianth; pistillate flowers borne singly or in clusters at the ends of the shoots produced in the spring, perianth mostly 4-parted, subtended by the fused bract and bractlets, all adnate to the ovary; styles 2, short; stigmas 2, large and fringed; drupe large, globose or ovoid, the exocarp somewhat fleshy, fibrous, and indehiscent, endocarp bony, rough or rugose; nut indehiscent or separating into two valves in decaying. (*Júglans*, the classical Latin name of the walnut, from *Jovis glans*, nut of Jupiter.)

A genus of about 15 species, mostly natives of the north temperate zone, one in the West Indies and one or two in the Andes of South America.

1. Bark gray; fruit oblong; twigs and foliage viscid-hairy 1. *J. cinerea*
2. Bark dark brown; fruit globose; twigs and foliage not viscid-hairy 2. *J. nigra*

1. Juglans cinerea L. Sp. Pl. ed. 2. 1415. 1763.

BUTTERNUT, WHITE WALNUT

A tree 15–30 m. high, with widespreading branches; bark of trunk divided into ridges, light brown or gray; young twigs glandular pubescent; leaves with glandular pubescent petioles 20–50 cm. long, leaflets 11–17, oblong-lanceolate, round or cordate at the base, acuminate at the apex, evenly and somewhat distantly fine serrate, very pubescent when young, becoming nearly glabrate above, permanently soft pubescent beneath, 5–12 cm. long, 2–5 cm. wide; staminate flowers in thick catkins, 5–8 cm. long; pistillate flowers in 2–6-flowered spikes, the flowers about 1 cm. long, stigma

JUGLANS CINEREA

red, large and fringed, 5–7 mm. long; fruit oblong-ovoid, clammy, obscurely 2–4-ridged, pointed, 4–6 cm. long; nut deeply sculptured and rough with sharp ridges, 2-celled at the base; seed very oily and sweet, edible. (*Cinérea*, ash-colored, referring to the bark.)

In rich woods and hillsides, common in the south and southeast parts of the state, extending northward to the Snake River in Pine and Kanabec counties, and along the Mississippi River to the north boundary of Aitkin County. Not found in the southwest corner of the state. New Brunswick to Ontario and Minnesota, south to Georgia, Arkansas, and Kansas. Blossoms in April and May, fruit ripe in September and October.

The wood is coarse-grained and not strong, light brown, becoming darker with exposure, weight 25 lbs. It takes a good polish, and is used in cabinet-making and in the interior finish of houses. The nuts are of excellent quality and will keep for years in good condition; they are somewhat unpopular on account of the difficulty of cracking the thick rugose shell. The green husks of the fruit were formerly much used for dyeing cloth yellow or orange. Sugar is sometimes made from the sap.

2. Juglans nigra L. Sp. Pl. 997. 1753.

BLACK WALNUT

A large, handsome tree, 20–40 m. high, with a trunk diameter of 4–8 dm.; branches widespreading; bark rough, very dark brown; young twigs glandular pubescent; leaves with glandular pubescent petioles 25–50 cm. long; leaflets 11–17, 4–12 cm. long, 1.5–5 cm. wide, ovate-lanceolate, rounded and often unequal at the base, acuminate at the apex, sharply serrate, sparsely pubescent when young, soon becoming nearly glabrate except along the midrib beneath, lower surface gland-dotted; staminate flowers in stout puberulous catkins 6–12 cm. long; pistillate flowers in 3–5-flowered spikes, stigmas yellowish green tinged with red 1–1.5 cm. long; fruit solitary or in pairs, globose, light yellowish green, slightly roughened, 4–5 cm. in diameter; nut oval or oblong, slightly flattened, 3–4 cm. in diameter, dark brown, irregularly ridged or corrugated, 4-celled at the base, slightly 2-celled at the apex; seed oily, strong flavored, edible. (*Nígra*, black.)

In rich woods, frequent in the southeastern part of the state, extending north to Nininger, Dakota County, and into southern Scott and Carver counties, and west to southern Redwood County, and Nobles County. It is occasionally planted as an ornamental tree, and grows rapidly, and is perfectly hardy far beyond its natural range. Western Massachusetts (where it is doubtfully native) and New York to southern Minnesota, south to Florida and Texas. Blossoms in May, fruit ripe in October and November.

The wood is heavy, hard, strong, rather coarse-grained, rich dark brown, and very durable, weighing 38 lbs.; in many respects the most valuable of our native woods. It takes a beautiful finish, and is used in fine furniture and cabinet-making, for the interior finish of houses, for gun stocks, etc. The nuts resemble butternuts in quality, but have a stronger flavor, which some people find unpleasant.

JUGLANS NIGRA

2. CARYA Nutt. Gen. 2: 221. 1818.

HICKORY

Hicoria Raf. 1808.

Trees with compound, odd-pinnate leaves; bark close and smooth, or shaggy; wood very tough and hard; staminate flowers in slender, pendulous catkins, borne in 3's on a common peduncle at the base of the shoots of the season, calyx adnate to the bract, 2–3 cleft; pistillate flowers sessile in 2–6-flowered spikes, with a calyx-like involucre, usually 4-lobed; styles 2 or 4, short, papillose or fimbriate; fruit subglobose, oblong or obovoid, the husk separating more or less completely into 4 valves; nut bony, smooth or angled, incompletely 2–4-celled; seed sweet and delicious or very bitter and astringent. (Gr. *cárya*, nut, walnut.)

A genus of about 12 species, mostly natives of eastern North America; one occurs in Mexico, and one in China.

1. Bark shaggy; leaves white-tufted along the margin; nut sweet — 1. *C. ovata*
2. Bark not shaggy; mature leaves almost smooth; nut bitter — 2. *C. cordiformis*

1. Carya ovata (Mill.) K. Koch, Dendrol. 1: 598. 1869.

SHAGBARK HICKORY, SHELLBARK HICKORY

Hicoria ovata (Mill.) Britton. 1888.

A large tree 16–30 m. high; bark of trunk shaggy, separating into narrow plates that are sometimes 25 cm. long, light gray, hard and tough; buds large, ovoid, obtuse or somewhat acute, the bud scales pubescent, the inner scales becoming greatly enlarged, petaloid, and very conspicuous when they unfold in the spring; leaves with petioles 15–30 cm. long, glabrous or pubescent; leaflets 5, rarely 7, narrowed at the base, acuminate at the apex, serrate, glabrous in age except the points of the serrations, which have tufts of hairs, the three upper leaflets obovate-lanceolate, 12–16 cm. long, 6–8 cm. wide, the lowest pair smaller and oblong-lanceolate; staminate catkins in groups of three, 6–8 cm. long, slender; fruit subglobose or depressed, 4–6 cm. long; nut white, slightly flattened and angled, mucronate-tipped, 4-celled at the base, shell hard; seed sweet and edible. (*Ovāta*, ovate.)

In rich woods, common in Houston and Winona counties, less frequent northwards as far as Wabasha, and in scattered localities as far west as Hickory Island, near Moscow, Freeborn County. New England and western Quebec to Minnesota, south to Florida and Texas. Blossoms in May, fruit ripe in September.

The wood is light brown in color, heavy, very hard and strong, close-grained and flexible, weighing 52 lbs. This, the strongest and heaviest of our native woods, is extensively used in the manufacture of automobiles, wagons, and agricultural machinery, also for axe handles, baskets, etc. The hickory nuts of commerce are obtained mainly from this species, probably the best flavored of our native nuts.

CARYA OVATA

CARYA CORDIFORMIS

2. Carya cordiformis (Wang.) K. Koch, Dendrol. 1: 597. 1869.

BITTERNUT, SWAMP HICKORY

Hicoria minima (Marsh.) Britton. 1888.

A rather slender tree 12–25 m. high; bark of trunk smooth or rough, but not peeling off in large, loose plates as in the preceding species; lateral buds obovoid, somewhat acute, terminal buds much elongated, narrow cylindrical with a conical tip, bud scales resin-dotted, ciliate, not becoming enlarged and petaloid in the spring; leaves 12–25 cm. long, with slender pubescent petioles; leaflets 5–9, lanceolate or oblong-lanceolate, sessile, narrowed or slightly rounded at the base, acuminate at the apex, sharply serrate, puberulent when young, glabrate in age, the three upper leaflets 9–12 cm. long, 2.5–4 cm. wide; staminate catkins in groups of three, slender, 8–12 cm. long; fruit subglobose, narrowly 6-ridged, 2.5–4 cm. long, husk thin, irregularly 4-valved; nut slightly compressed, short pointed with a persistent stigma, 1.5–2.5 cm. long, thin shelled; seed very bitter. (*Cordifórmis*, heart-shaped, not particularly appropriate.)

In rich moist woods, common southward, and extending through the Big Woods north to Mille Lacs, and infrequently to the upper Mississippi and the tributaries of the St. Louis River. New England and western Quebec to Lake Huron, and Minnesota south to Florida and Texas. Blossoms in May, fruit ripe in September and October.

The wood is light brown, close-grained, very hard, heavy, strong, and tough, weighing 47 lbs. It is largely used for hoops of flour barrels, ox yokes, fuel, etc.

MYRICACEAE BAYBERRY FAMILY

Shrubs or trees, leaves simple, alternate, generally coriaceous, resin-dotted and aromatic; flowers monoecious or dioecious, in short scaly catkins, solitary in the axil of the bract; calyx and corolla lacking; staminate flower with 2–16 stamens; filaments short, free or more or less united, anthers 2-celled; pistillate flowers consisting of a solitary 1-celled ovary, subtended by 2–8 bracts; ovule 1; style short, stigmas 2, linear; fruit a drupe-like nut.

A family of two genera and about 40 species of wide geographic distribution, most abundant in the subtropics.

1. Leaves entire or slightly serrate, without stipules — 1. *Myrica*
2. Leaves deeply pinnatified or cut, stipulate — 2. *Comptonia*

1. MYRICA L. Sp. Pl. 1024. 1753.

Shrubs or small trees; leaves entire, serrate or dentate, mostly resin-dotted; flowers monoecious or dioecious; staminate catkins oblong or cylindric; stamens 4–8, filaments slightly united below; pistillate catkins ovoid or globular; pistil subtended by 2–4 deciduous or persistent bractlets; fruit small, globular or short-cylindric, dry, coated with resinous granules or

wax. (*Myrica*, the ancient Greek name of a shrub, perhaps from the fragrance.)

A genus of 39 species of wide geographical distribution; besides the following, 3 occur in the eastern and southern parts of the United States and 2 on the Pacific Coast. Only the following species occurs in Minnesota.

COMPTONIA ASPLENIFOLIA MYRICA GALE

1. Myrica Gale L. Sp. Pl. 1024. 1753.

SWEET GALE

A branching shrub 0.5–1.5 m. high; branches dark brown, with pale lenticels; young shoots slightly pubescent; leaves oblanceolate, cuneate at

the base, obtuse and dentate at the apex, dark green and glabrous above, pale and pubescent or glabrous beneath, mostly resin-dotted on both sides and aromatic, 3–6 cm. long, 8–18 mm. wide; petioles about 2 mm. long; staminate catkins oblong-cylindrical, 10–15 mm. long, loose-bracted; pistillate catkins ovoid-oblong, about 5 mm. long, stigma very prominent; fruiting catkin 7–10 mm. long; drupe resinous-waxy, enclosed by 2 thick, persistent bractlets, 2–3 mm. long. (*Gále*, an aromatic plant.)

In swamps and along lakes and streams, frequent in the northeast corner of the state, especially along the north shore of Lake Superior and as far south as Carlton County. Labrador to Alaska, south to the mountains of Virginia, northern Indiana, Minnesota, and Washington, also in Europe and Asia. Blossoms in May and June, fruit ripe in August.

2. COMPTONIA L'Her. ex Ait. Hort. Kew. 3: 334. 1789.

A low, branching shrub; leaves with stipules; flowers in catkins, monoecious or dioecious; staminate catkins cylindric; stamens 4–8 in the axils of the bracts; pistillate catkins ovoid or globose, borne below the staminate catkins in monoecious plants; pistil subtended by 8 persistent narrow bracts which form a bristly involucre in the ripe fruit; fruit a bony oblong nut. (*Comptónia*, named for Bishop Compton of Oxford.)

A monotypic genus of eastern North America.

1. Comptonia asplenifolia (L.) Ait. Hort. Kew. 3: 334. 1789.

SWEET FERN

Myrica asplenifolia L. 1753.
Comptonia peregrina (L.) Coulter, 1894.

A shrub 3–6 dm. high; leaves linear-lanceolate, regularly and deeply pinnatifid and fern-like, sweet-scented, acute or rounded at the apex, narrowed at the base, glutinous, sparingly pubescent, 6–12 cm. long, 10–15 mm. wide; lobes uniform, rhombic or nearly semicircular, entire; petiole about 5 mm. long; stipules semicordate, usually deciduous; staminate catkins clustered at the ends of branches, 3–4 cm. long; pistillate catkins becoming bur-like in fruit, about 1 cm. in diameter. (*Asplenifólia*, having leaves like the fern, *Asplenium*.)

In dry, sandy soil, frequent northeastward, occuring scattered farther south to Pine County and southwest to Cass Lake. Also reported from near Excelsior, Hennepin County, but it is doubtful if it occurs there. New Brunswick to Saskatchewan, south to North Carolina, Tennessee, Michigan, and Minnesota. Blossoms in April and May, fruits in autumn.

BETULACEAE BIRCH FAMILY

Monoecious or rarely dioecious trees or shrubs with alternate, petioled, simple, pinnately veined, serrate or dentate leaves with deciduous stipules;

flowers in catkins or spikes or head-like clusters; staminate flowers 1–3, in the axil of each bract, each flower consisting of 2–several stamens, naked or with a 2–4-parted membranous perianth, filaments distinct, sometimes 2-forked and with the 2 anther sacs separate, or undivided and the anther sacs united; pistillate flowers 2–3 in the axils of each bract, with or without a perianth adnate to the 2-celled ovary, carpels 2; style deeply 2-cleft or divided; ovules 1–2 in each cell of the ovary; fruit a 1-seeded nut or nutlet, subglobose or ovoid, more or less flattened and frequently membranous-winged (samara), subtended or completely enclosed by the more or less enlarged bract and connate bracteoles.

A family of 6 genera and about 90 species mostly native of the north temperate zone.

1. Pistillate flowers clustered, not in catkins; fruit a hard-shelled nut, tightly enclosed in a large fringed or beaked involucre 1. *Corylus*
2. Pistillate flowers in catkins; fruit a thin-shelled nutlet, with or without wing, subtended by bracts or enclosed in a loose sack.
   a. Pistillate catkins loose and few-flowered; nutlet ovoid, wingless, subtended by or enclosed in an enlarged bract.
      (1) Fruiting bract 3-lobed, leaf-like, with serrate margin, bark smooth 2. *Carpinus*
      (2) Fruiting bact closed, sack-like, bark scaly 3. *Ostrya*
   b. Pistillate catkins compact, many flowered; fruit a flattened, generally winged nutlet, subtended by a small, 3–5-lobed bract.
      (1) Fruiting bract 3-lobed, deciduous with the nutlets 4. *Betula*
      (2) Fruiting bract 5-lobed, persistent 5. *Alnus*

1. CORYLUS L. Sp. Pl. 998. 1753.

HAZEL

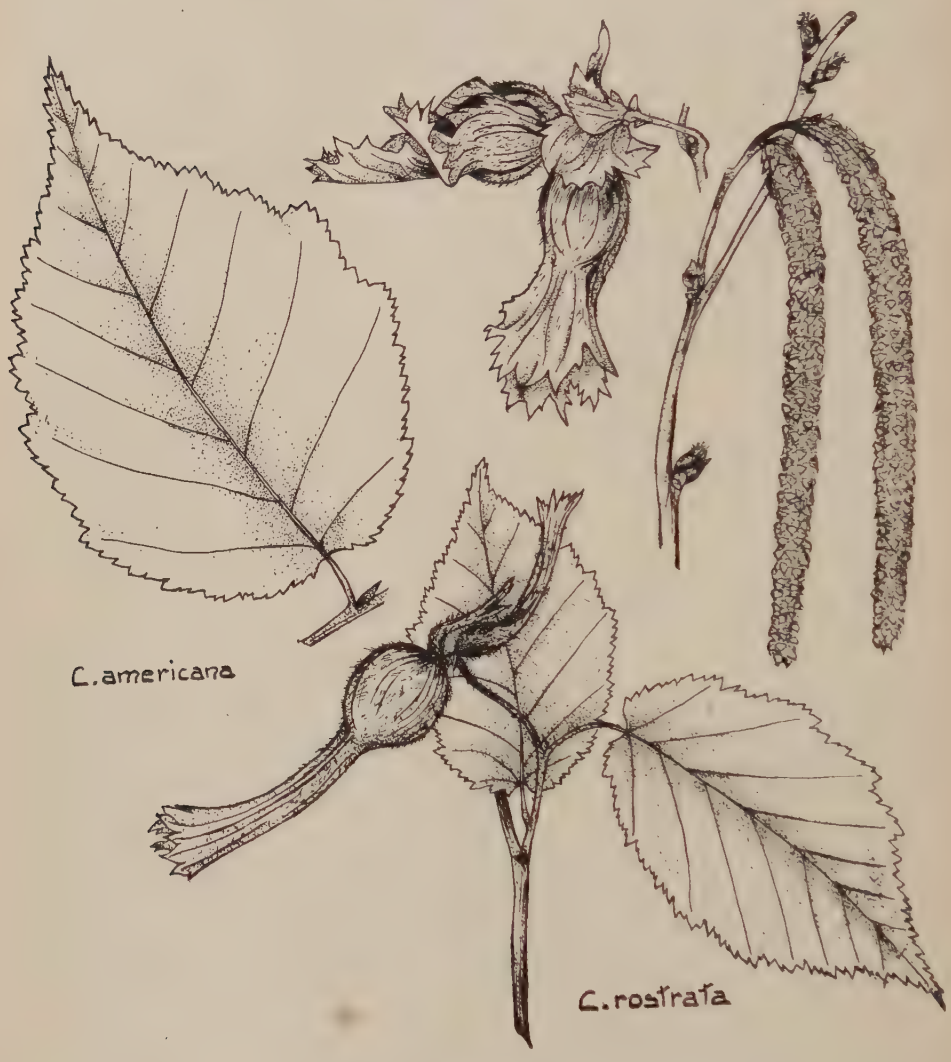
Shrubs or small trees with alternate, broad, serrate or slightly lobed or incised leaves; staminate catkins 1–3 at the ends of twigs of the previous season, expanding long before the leaves, the flowers solitary in the axil of each bract; stamens 4, each filament 2-cleft or forked and each branch bearing an anther sac (making apparently 8 stamens); pistillate flowers several, from scaly buds, terminating early, leafy shoots; ovary inferior, crowned with a small adherent perianth; stigmas 2, long and slender; nut ovoid or subglobose, enclosed in a leafy involucre or husk, consisting of two more or less united and enlarged bracts. (*Córylus*, the classical name of the hazel, perhaps from Gr. *corys*, a helmet, in allusion to the involucre.)

1. Young twigs hispid-pubescent; involucre consisting of 2 broad fringed bracts 1. *C. americana*
2. Young twigs with scattered long hairs, becoming glabrate; involucral bracts united and prolonged into a tubular bristly beak 2. *C. rostrata*

1. **Corylus americana** Walt. Fl. Car. 236. 1788.

HAZELNUT

A shrub, 1–2.5 m. high; bark gray and smooth; young twigs and petioles hispid-pubescent or glandular-bristly; leaves ovate or broadly oval, obtuse or cordate at the base, acuminate at the apex, serrate all around, sometimes



CORYLUS

Corylus americana above, leaf, fruiting involucres, and flowering twig. Corylus rostrata below.

slightly lobed, glabrous or nearly so above, finely tomentose especially along the veins beneath, 6–16 cm. long, 4–12 cm. wide; petioles 5–20 mm. long; staminate catkins 4–8 cm. long; involucre of the nut composed of 2 leaf-like bracts, free down to the nut, serrate or cut along the margins, finely pubescent and with scattered glandular bristles; nut compressed, light brown and mostly striate, 1–1.5 cm. long; seed edible. (*Americána*, American.)

In thickets, on hillsides, etc., common, and in places abundant throughout the state. Distributed from Maine and Ontario to Manitoba, south to Florida and Kansas. Flowers in March and April, fruit ripe from July to September.

2. Corylus rostrata Ait. Hort. Kew. 3: 364. 1789.

BEAKED HAZELNUT

A shrub, 2–5 m. high; bark gray, with scattered lenticels; young twigs with a few long hairs most abundant towards the base of the year's growth, tending to become glabrate in late summer; leaves ovate or oval, cordate or rounded at the base, acuminate at the apex, sharply and somewhat irregularly serrate or slightly lobed, glabrous above, or with a few scattered hairs, pubescent at least along the veins beneath, 5–13 cm. long, 3.5–8 cm. wide, occasionally larger; petiole about 1 cm. long, puberulent, and with scattered long hairs; involucral bracts united into a beak, lacerate at the end, 3–4 cm. long beyond the nut, bristly hairy; nut ovoid, slightly compressed, and striate, 10–12 mm. long; seed edible. (*Rostráta*, furnished with beak, like the prow of a vessel.)

In woods and thickets, common northward especially north of Lake Superior, where the bushes reach a height of 4–5 m., rare and local southward, extending southwest to Douglas County, and southeast to Houston County. Distributed from Quebec to British Columbia, south to Delaware, Georgia, Michigan, Missouri, and westward. Blossoms in April and May, fruit ripe in August and September.

2. CARPINUS L. Sp. Pl. 998. 1753.

HORNBEAM

Trees and shrubs with smooth gray bark, stem ridged; leaves with straight veins, ending in the primary teeth; flowers in catkins; staminate catkins from lateral, short branches, cylindric, about 4–6 cm. long, one staminate flower to each bract; stamens 3–several; pistillate flowers in short terminal catkins, 2 flowers to each primary, deciduous bract, each subtended by a secondary bract and two bracteoles, which persist, enlarge, and become a 3-lobed wing at maturity; stigmas 2, awl-shaped; fruit a nutlet, ovoid, several-nerved, not winged, situated at the base of the secondary bract. (*Carpínus*, the Latin name of the hornbeam.)

A genus of about 12 species native of the northern hemisphere. Only the following species is native to America.

1. **Carpinus caroliniana** Walt. Fl. Car. 236. 1788.

AMERICAN HORNBEAM, "BLUE BEECH"

A small tree, 6–10 m. high; stem ridged; bark smooth, gray, sometimes with lighter blotches; leaves ovate to ovate-lanceolate, with the principal

CARPINUS CAROLINIANA OSTRYA VIRGINIANA

veins nearly straight and parallel, rounded at the base, acuminate at the apex, sharply and doubly serrate, glabrous above, pubescent in the axils of the veins beneath, 4–8 cm. long, 2–4 cm. wide; petioles slender, about 1 cm. long; staminate catkins 3–5 cm. long, scales brown, triangular, veiny

and pubescent along the margin, anthers hairy at the tips; pistillate catkins terminating leafy shoots, very pubescent, secondary bract in fruit 3-lobed and prominently veined, about 25 mm. long; nutlets ovate, veined, 5 mm. long. (*Caroliniána*, from Carolina.)

In moist woods, especially along streams, common throughout the south half of the state, extending north into Pine County and to the White Earth Reservation. Nova Scotia to Ontario and Minnesota, south to Florida, and Texas. Blossoms in April and May, fruit ripe in August.

Wood light brown, close-grained, very hard and durable, weight 45 lbs. Used for wedges, levers, and for fuel.

3. OSTRYA Scop. Fl. Carn. 243. 1772.

Small to medium-sized trees; bark brown and furrowed, foliage resembling that of the birch; leaves with slightly bent veins; staminate catkins 1–3 together, from scaly buds at the tips of the branches of the previous year; flowers solitary in the axil of each bract, stamens 2–10; pistillate catkins solitary, at the ends of short leafy branches of the season, 2 flowers to each primary bract, each flower subtended by a secondary bract, which enlarges and becomes sack-like in fruit, pistil incompletely 2-celled, tipped with 2 long stigmas, ovules 2; nutlet ovoid or oblong, smooth and shiny, at the bottom of an inflated sac, the mature pistillate catkin hop-like. (*Óstrya*, the classical name of this tree.)

A genus of 4 species. Besides the following another occurs in the southwestern part of the United States, one in Europe and Asia, and one in Japan.

1. Ostrya virginiana (Mill.) Koch, Dendrol. 2²: 6. 1873.

HOP HORNBEAM, IRONWOOD

A tree 7–13 m. high, and 1–3 dm. in diameter; bark brown, finely furrowed and scaly; twigs of the season pubescent; leaves ovate or oblong-ovate, rounded or slightly cordate at the base, often oblique, acuminate at the apex, sharply and mostly doubly serrate, slightly pubescent especially along the veins, 5–11 cm. long, 2.5–5 cm. broad; petioles 3–10 mm. long, pubescent; staminate catkins 2–3 cm. long, bracts triangular, acute, anthers with a tuft of hairs at the apex; the secondary bract of each pistillate flower forming a sack in fruit, 12–14 mm. long, veined, bristly hairy at the base; nutlets compressed, shining, 5 mm. long, the ripe hop-like catkin drooping or spreading. (*Virginiána*, from Virginia.)

Mostly in rich woods, throughout the state, in some localities abundant, especially in the Big Woods where it forms a characteristic middle stratum between the larger trees and the shrubby undergrowth. It does not occur close to the shores of Lake

Superior. Distributed from Nova Scotia to Manitoba, Minnesota, Nebraska, and southwestward. Blossoms in April and May, fruit ripe in July and August.

Wood light brown, close-grained, hard, durable, and heavy, next to the shell-bark hickory our hardest and heaviest wood (weight 51 lbs.), but limited in usefulness by its small size; used for wedges, levers, etc., and for fuel.

Flowering Twigs of Ostrya virginiana

4. BETULA L. Sp. Pl. 982. 1753.

BIRCH

Trees or shrubs with serrate or dentate, sometimes lobed leaves; flowers in catkins, the staminate terminal and lateral, formed in the summer and remaining naked during the winter, expanding in the spring with or before the leaves; the pistillate terminating short, usually 2-leaved shoots of the season; the staminate flowers usually 3 in the axil of each shield-shaped scale or bract, subtended by 2 bractlets, each flower consisting of two 2-cleft stamens (each division a half anther) and a perianth of 2 unequal segments; pistillate flowers 2 or 3 to each primary bract, subtended by two bractlets, without a perianth; ovary 2-celled, stigmas 2, elongated, mostly persistent; fruit a lenticular winged nutlet or samara; scales of the fruiting catkins 3-lobed, deciduous with the nutlets. (*Bétula*, Latin name of the birch.)

A genus of about 40 species, natives of the arctic and north temperate zones; several of the species hybridize in nature.

1. Trees with white or nearly white outer bark.
   a. Leaves serrate, doubly serrate, or obscurely lobed, but not deeply divided or cut; twigs not long-pendulous.

(1) Bark of trunk not furrowed; leaves ovate to cordate; middle lobe of fruiting bract twice as long as the lateral lobes (native).
(a) Leaves ovate, rounded or truncate at the base; fruiting catkins 1.5–4.5 cm. long; bracts 4–6 mm. long 1. *B. papyrifera*
(b) Leaves cordate; fruiting catkins 5–7 cm. long; bracts 6.5–8.5 mm. long 2. *B. cordifolia*
(2) Bark dark-furrowed toward the base of the trunk; leaves rhombic or triangular; middle lobe of fruiting bract triangular, scarcely longer than the spreading or reflexed lateral lobes (cultivated) 3. *B. pendula*
b. Leaves deeply cut and lobed, twigs very slender and drooping 3. a *B. pendula*, f. *dalecarlica*
2. Trees or shrubs with gray, yellowish, or reddish brown bark.
a. Trees, bark peeling in thin layers at least on upper trunk and branches.
(1) Outer bark yellowish or gray, inner bark with flavor of wintergreen; fruiting catkins sessile or nearly so; bracts ciliate-margined 4. *B. lutea*
(2) Outer bark greenish brown or reddish, inner bark without wintergreen flavor; fruiting catkins peduncled; bracts tomentose 5. *B. nigra*
b. Shrubs or small trees, bark not peeling, grayish to reddish brown.
(1) Slender shrubs 0.5–3 m. high; leaves obovate to suborbicular, petioles 3–5 mm. long 6. *B. pumila* var. *glandulifera*
(2) Tall shrubs or small trees 4–8 m. high; leaves ovate, rhombic-ovate or elliptic, petioles 7–14 mm. long.
(a) Inner bark without wintergreen flavor; fruiting catkins 6–7 mm. in diameter; wings of samara as wide or wider than the nutlet 7. ×*B. Sandbergi*
(b) Inner bark with wintergreen flavor; fruiting catkins 10–12 mm. in diameter; wings of the samara narrower than the nutlet 8. ×*B. Purpusii*

1. **Betula papyrifera** Marsh. Arb. Am. 19. 1785.

PAPER BIRCH, CANOE BIRCH

Betula alba var. *papyrifera* (Marsh.) Spach, 1841.

A large tree, reaching a maximum height of 25 m. and a trunk diameter of 2–5 dm.; bark white (except on young trees where it is reddish brown) and peeling off in papery layers; twigs slender with pale lenticels; leaves ovate, 4–8 cm. long, 3–5 cm. wide, with 6–8 pairs of lateral veins, abruptly cuneate, rounded, truncate or subcordate at the base, acute or acuminate at the apex, doubly and often irregularly serrate or somewhat lobed, dark green and glabrous above, pubescent along the veins beneath and glandular or resin-dotted; staminate catkins 5–10 cm. long; pistillate catkins slender, erect, at the ends of short leafy shoots, 2–3 cm. long; fruiting catkin drooping, 3–5 cm. long, 7–10 mm. in diameter; fruiting bracts 3-lobed, about 4 mm. long, puberulent, the middle lobe narrowly ovate, longer than the rounded, slightly ascending lateral lobes; samara 3.5–4.5 mm. wide; nutlet elliptic, narrower than the wings of the samara. (*Papyrifera*, paper-bearing.)

Common and in places very abundant throughout the state except southwestward. Distributed from Newfoundland and Labrador to Hudson Bay and Alaska, south to

New York, Pennsylvania, Indiana, northern Iowa, Nebraska, Wyoming, and Washington. Blossoms in April and May, fruits in August and September.

Wood light brown, close-grained, strong and tough, weight 37 lbs. It is used for making spools, shoe lasts and pegs, for wood pulp and fuel. The Indians use the wood for making snow-shoe frames, sledges, and paddles, the bark in making canoes, receptacles for gathering maple sap, drinking cups, and for covering tepees, the sap sometimes as a drink and boiled down as a syrup.

BETULA PAPYRIFERA

BETULA CORDIFOLIA

2. Betula cordifolia Regel, Nouv. Mem. Soc. Nat. Mousc. 13: 86. 1860.

A large tree 20–25 m. high, of erect growth, with a trunk diameter up to 8 dm.; bark smooth, peeling in papery layers, flesh-colored on the outside, pale orange in the deeper layers; buds ovoid, reddish brown, 5–6 mm. long; young twigs brownish yellow, glabrous, abundantly glandular-dotted; older twigs reddish brown, conspicuously marked by numerous pale lenticels; leaves broadly ovate, 5–9 cm. long, 4–7.5 cm. wide, with 6–9 pairs of lateral veins, cordate at the base, acuminate at the apex, margin doubly or somewhat irregularly serrate, dull green and glabrous above, or with a few hairs along the veins, paler beneath and pilose along the veins, both surfaces with small resinous dots; petiole rather stout, 1–2.5 cm. long, sparingly villous or glabrate; staminate catkins from terminal buds, usually in pairs; pistillate catkins on short 1–3-leaved shoots from short lateral

spurs, in fruit becoming 5–7 cm. long, and 8–12 mm. in diameter; peduncles 1.5–2.5 cm. long; fruiting bracts, 6.5 8.5 mm. long, deeply 3-lobed, the middle lobe much longer than the strongly ascending lateral lobes, margins of the lobes ciliate; samara about 5 mm. wide, the elliptical nutlet narrower than the wings, persistent styles fully 2 mm. long. (*Cordifólia*, referring to the heart-shaped leaves.)

A large and handsome tree, common north of Lake Superior where it forms an important part of the general forest. Labrador and Newfoundland to northern New England, westward to Minnesota, also Mt. Mitchell, North Carolina.

3. Betula pendula Roth. Tent. Fl. Germ. 1: 405. 1788.

EUROPEAN WHITE BIRCH

Betula verrucosa Ehrh. 1791.
Betula alba L. 1753, in part.

A small to medium-sized tree, 6–12 m. high; bark white, peeling slightly into papery layers except at the base where it is more or less rough and furrowed and dark gray in color; branches slender and more or less drooping; young twigs reddish and glandular-dotted, older twigs gray to dark brown; leaves rhombic-ovate, 4–8 cm. long, 3.5 5.5 cm wide, broadly wedge-shaped or truncate at the base (on vigorous shoots subcordate at the base and often larger), acuminate at the apex, doubly serrate to somewhat lobed, at first sparsely pubescent and glutinous, soon becoming entirely glabrous, bright green above, somewhat paler beneath, more or less gland-dotted on both surfaces; petioles slender, 2–3 cm. long; staminate catkins 3–6 cm. long; pistillate catkins on short, lateral, bifoliate shoots, in fruit 2–3.5 cm. long and 7–10 mm. in diameter, pointing towards the tip of the branch on which they are borne; peduncles 10–18 mm. long; fruiting bracts 3-lobed, 5–7 mm. long, the middle lobe triangular, shorter than the spreading or somewhat recurved, rounded lateral lobes; samaras 5–6 mm. wide; nutlet narrowly elliptic, narrower than the wings. (*Péndula*, referring to the somewhat drooping twigs.)

Introduced from Europe, sometimes planted as a park tree and passing under the name of *Betula alba* L. It is less frequently planted than the following horticultural variety. Blossoms in April or May, fruit ripens in September or October.

3a. B. pendula f. dalecarlica (L.f.) Schneider, Ill. Handb. Laubholzk. 1: 112. 1904.

CUT-LEAF WEEPING BIRCH

Betula laciniata Wahlenb. 1824.

A medium-sized tree with long, slender, drooping branches and deeply lobed or cut leaves; leaves narrowly ovate in outline, 4–7 cm. long, 2 5 cm. wide, with usually 3 4 pairs of long-attenuate pointed lobes, narrowed at the base, long acuminate at the apex, sharply and irregularly serrate, glabrous and glandular-dotted on both surfaces, dark green above, somewhat paler beneath; petioles very slender, 2 3.5 cm. long; fruiting catkins 3–4 cm. long and about 1 cm. in diameter, borne on drooping peduncles. (*Dalecárlica*, named from the Province Dalecarlia of Sweden where the form occurs spontaneously.)

The horticultural form known as forma *gracilis* is a cross between this form and

Young's weeping birch. (*B. pendula* f. *Youngi* Schneider.) It has even longer and more drooping branches. It passes under the horticultural names *B. elegans laciniata* and *B. alba laciniata gracilis pendula*, but like many minor horticultural forms is probably best called by its vernacular name, the cut-leaf weeping birch.

4. **Betula lutea** Michx. f. Arb. Am. 2: 152. 1812.

YELLOW BIRCH

A large tree sometimes attaining a height of 25–30 m. and a trunk diameter of 1 m.; bark of trunk gray or yellowish gray, peeling freely into thin papery layers and producing a ragged appearance of the main stem and lower branches; twigs gray or brownish, dotted with light-colored lenticels; inner bark aromatic, with the flavor of wintergreen; leaves ovate to oblong-ovate, 5–11 cm. long, 3–7 cm. wide, rounded or subcordate and mostly unequal at the base, acuminate at the apex, sharply doubly serrate, dark green and dull above, paler beneath and pubescent along the veins; petioles 1–1.5 cm. long, pubescent; staminate catkins 2–4 together, 4–8 cm. long; pistillate catkins sessile, about 1 cm. long; fruiting catkins oblong-ovate to subglobose, 1.5–2.5 cm. long, 1.2–1.6 cm. in diameter; fruiting bracts deeply 3-lobed, 6–8 mm. long, ciliate on the margins, middle lobe oblong, longer than the ovate-oblong, ascending lateral lobes; nutlet elliptic, wider than the wings of the samara. (*Lútea*, yellow, referring to the bark.)

In rich, moist woods, common along the eastern border, especially in the St. Croix River Valley; less frequent and scattered, mostly in tamarack swamps, throughout most of the coniferous area of the state. Distributed from Newfoundland to Manitoba, south to Indiana, Illinois, and Minnesota. Flowers in May, fruit ripe in August and September.

The yellow birch is one of the most valuable timber trees of eastern North America. Wood light brown, close-grained, hard, and heavy, taking a beautiful polish, weight 40 lbs. It is largely used in the manufacture of furniture, inside finish, and for fuel. Most imitation mahogany is made from this wood.

5. **Betula nigra** L. Sp. Pl. 982. 1753.

RED BIRCH, RIVER BIRCH

A tall, usually slender tree, sometimes attaining a height of 30 m.; bark at the base of old trunks dark brown, deeply furrowed, higher up on the main stem and on the larger branches lustrous reddish brown and peeling more or less freely; twigs reddish; young twigs pubescent; leaves triangular-ovate, 3.5–8 cm. long, 2.5–6 cm. wide, broadly wedge-shaped or truncate at the base, obtuse or acute at the apex, irregularly serrate or somewhat pinnately lobed, dark green and glabrous above when mature, paler and glabrous or somewhat tomentose beneath; petioles 8–15 mm. long; staminate catkins 2–3 together, 6–10 cm. long; pistillate catkins oblong-cylindric, 1–1.5 cm. long, about 4 mm. in diameter; fruiting catkins oblong-ovoid,

stalked, spreading, 1.5–2.5 cm. long, 11–14 mm. in diameter; fruiting bracts deeply 3-lobed, 6–8 mm. long, tomentose, the lateral lobes ascending and nearly as long as the middle lobe; samaras 6–7 mm. wide; nutlet twice as wide as the wings of the samara. (*Nígra*, black.)

Along the bottom lands of streams and rivers; common along the Mississippi River as far as Wabasha County, less frequent to the confluence of the St. Croix River, also reported from near Mankato. Distributed on the Atlantic and Gulf coastal plain from Massachusetts to Texas and up the Mississippi River and its tributaries to Indiana, Wisconsin, Minnesota, and Kansas. Blossoms in April and May, fruit ripe in autumn.

The wood is light brown, close-grained, hard, and strong, weight 36 lbs. It is used in the manufacture of furniture and for staves and fuel.

BETULA NIGRA BETULA LUTEA

6. **Betula pumila** var. **glandulifera** Regel, Bull. Soc. Nat. Mousc. 38: 410. 1865.

LOW BIRCH, DWARF BIRCH

A shrub 0.5–3 m. high, with erect or ascending stems and slender branches; bark dark gray to reddish brown or dark brown, with numerous light-colored lenticels; young twigs more or less abundantly gland-dotted, at first finely puberulent or sparingly pubescent but at length glabrate; leaves obovate or elliptic to suborbicular, 1–3 cm. long, 8–20 mm. wide (occasionally larger on vigorous vegetative shoots), usually acute or some-

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times rounded at the apex, narrowly to broadly cuneate at the base, serrate or crenate-serrate, gland-dotted on both surfaces and glutinous when young, at first somewhat pubescent along the veins but generally becoming quite glabrous with age, finely reticulate-veined; petioles 2–5 mm. long; staminate catkins erect, about 1 cm. long; pistillate catkins 5–8 mm. long, borne on very short, naked or 1–2-leaved lateral shoots; fruiting catkins oblong-cylindrical 8–20 mm. long, 6–8 mm. in diameter; fruiting bracts 3–3.5 mm. long, lateral lobes ascending, generally shorter than the middle lobe, sparingly ciliate along the margins; samaras nearly orbicular, the wings narrower than the nutlet. (*Púmila*, dwarf, referring to the low stature, *glandulífera*, gland-bearing, in reference to the gland-dotted leaves and young twigs.)

Common in acid meadows, bogs, and tamarack swamps throughout the northern half of the state and as far south as Hennepin County, rare and local southward in Goodhue, Olmsted, Fillmore, and Houston counties. Distributed from Ontario to Saskatchewan, south to northern Indiana and southeastern Minnesota.

The true dwarf birch, *B. pumila*, of the northeastern United States, eastern Canada, Labrador, and Newfoundland is represented in the Great Lakes region by the above described variety. Occasional pubescent forms of dwarf birch occurring in this region closely simulate true *B. pumila* but in all cases they appear to be segregates of the following hybrid.

7. ×**Betula Sandbergi** Britton, Bull. Torr. Bot. Club, 31: 166. 1904.

B. papyrifera×*pumila* var. *glandulifera*.

A shrub or sometimes a shrub-like tree 2–10 m. high; bark dark brown, not separating into layers; young branches rusty-pubescent, in late summer or fall mostly shedding the hairs and remaining merely puberulent and showing scattered resiniferous dots and lenticels, older twigs at first grayish, later becoming reddish brown through exfoliation of the epidermal layers; leaves ovate, rhombic-ovate or rarely elliptical to obovate, with 4–5 pairs of veins, cuneate or sometimes rounded at the base, acute or rounded at the apex, 2.5–5.5 cm. long, 1.5–3.5 cm. wide (on sterile shoots usually more broadly ovate and larger), serrate, the serrations somewhat crenate and occasionally uneven, thick and firm in texture, dull green, glabrous and finely reticulate-veined above, the reticulations conspicuous in dried specimens, paler beneath and pubescent, especially along the veins, at length becoming nearly or quite glabrous, dotted with fine resinous glands; petioles 7–13 mm. long; staminate catkins borne singly or in pairs at the ends of the branches, 3–5 cm. long, 5 mm. thick; pistillate catkins 10–14 mm. long, 1.5–2 mm. thick, stalked; fruiting catkins cylindrical, erect, 2–2.5 cm. long, 5–7 mm. in diameter, their peduncles about 1 cm. long; bracts 4 mm. long, about 3.6 mm. wide, the lateral lobes spreading, shorter than the tapering middle lobe, puberulent on the back and finely ciliate-pubescent along

the margins of the lobes; samara 3.2–3.5 mm. wide, nutlet 1.3 mm. wide, mostly slightly narrower than the wing. (*Sandbérgi*, named for J. H. Sandberg, who made extensive collections of Minnesota plants.)

Infrequent in tamarack swamps. It has been found at several stations in Hennepin, Ramsey, and Anoka counties, in each case associated with the parent species. Also reported from Saskatchewan and Montana. This hybird is fertile to a limited degree, and its progeny segregates into forms more or less resembling one or the other parent. Some of these segregates apparently occur in nature in the vicinity of the Twin Cities, and occasionally they very closely simulate typical *B. pumila*.

BETULA SANDBERGI BETULA PUMILA VAR. GLANDULIFERA BETULA PURPUSII

8. ×**Betula Purpusii** Schneider, Ill. Handb. Laubholzk. 1: 102. 1904.

B. lutea×*pumila* var. *glandulifera*.

A shrub or shrub-like tree 3–6 m. high, with grayish brown bark not separating into layers, inner bark with wintergreen flavor; young twigs puberulent or thinly pubescent, with a few small resin glands, 1–3-year old twigs gray, changing to grayish brown on older branches; spur shoots numerous with closely crowded leaf scars; leaves ovate to oblong-ovate or elliptical, rarely obovate, with 5–7 pairs of veins, broadly cuneate or rounded to subcordate at the base, acute at the apex, 2.5–6 cm. long, 1.5–3.5 cm. wide, dull green and glabrous above, much lighter and at first pubescent along the veins beneath, soon becoming nearly or quite glabrous, often glandular-dotted, mostly unevenly and sharply serrate to crenate-serrate,

thick and firm in texture; petioles stout, 7–14 mm. long with a few scattered hairs; staminate catkins borne singly or in pairs at the ends of the branches, 3–5 cm. long in anthesis, about 5 mm. in diameter; pistillate catkins erect, sessile or nearly so, about 10 mm. long, 2–2.3 mm. thick; fruiting catkins oblong-ovoid, 1.5–2.8 cm. long, 10–12 mm. in diameter, erect, peduncles 3–8 mm. long; bracts 5.4–7 mm. long, 4.3–5.5 mm. wide, ciliate-pubescent along the margins of the lobes, lateral lobes broad and only slightly spreading, middle lobe blunt triangular; samara ovate to slightly obovate, 2.5–3 mm. wide, nutlet 1.6–1.8 mm. wide, about twice as wide as the wing. (*Purpúsii*, named for J. A. Purpus of the Darmstadt botanical garden.)

In tamarack swamps, comparatively rare. General range unknown, the original specimens came from "Clark's Lake," Michigan.

5. **ALNUS** Hill, Brit. Herb. 510. 1756.

ALDER

Shrubs or trees with dentate or serrate leaves and few-scaled buds; flowers in catkins, appearing the preceding season and expanding before or with the leaves; staminate flowers 3 in the axil of each bract, subtended by 4 bractlets, each flower with a perianth of four parts, stamens 4; pistillate flowers 2 in the axil of each bract, 2 small bractlets subtending each flower, perianth lacking, ovary 2-celled, styles 2; in fruit the bracts becoming woody and 5-toothed or pointed and together forming a cone-like structure; nutlet flattened, with or without wings. (*Álnus*, the Latin name of the alder.)

A genus of about 14 species, natives of the northern hemisphere and the Andes. In addition to the following some 6 or 7 species occur in North America.

1. Leaves finely serrate, resinous beneath when young; nutlets with a membranous wing 1. *A. crispa*
2. Leaves coarsely serrate, not resinous, nutlet acute-margined, wingless 2. *A. incana*

1. **Alnus crispa** (Ait.) Pursh, Fl. Am. Sept. 2: 623. 1814.

GREEN ALDER, MOUNTAIN ALDER

A shrub 0.6–3 m. high, bark gray or brownish; young shoots brownish, more or less pubescent and glutinous; leaves ovate or oval, rounded at the base, obtuse or acute at the apex, finely, sharply, and often irregularly serrulate or incised-serrate, dark green and glabrous above, lighter green and usually pubescent beneath along the veins (young foliage glutinous and more or less pubescent), 4–8 cm. long, 3.5–5 cm. wide; petioles 8–10 mm. long; catkins expanding with the leaves, the staminate 2–3 together, slender,

6–10 cm. long, the pistillate in a loose raceme; fruiting catkin 15–18 mm. long, 7–9 mm. thick, the persistent scales firm and woody, irregularly 5-lobed, about 4 mm. long; samara 2–2.5 mm. wide, nutlet ovoid, slightly broader than the wing. (*Crispa*, curled, referring to the margin of the leaves.)

ALNUS CRISPA

ALNUS INCANA

Cool shores and banks, common in the northern part of the state, especially north of Lake Superior. Distributed from Newfoundland and New Brunswick to Alaska, south to Massachusetts, New York, Michigan, and British Columbia, and in the mountains to Virginia and North Carolina. Flowers in June, fruit ripe in September.

This species in Winkler's monograph of the *Betulaceae* is given as var. *crispa* of *A. alnobetula*. It seems better to regard it as a distinct species.

2. **Alnus incana** (L.) Moench, Meth. 124. 1794.

SPECKLED ALDER, HOARY ALDER

A tall shrub or occasionally a small tree, 2–8 m. high, stems erect or ascending; bark dark brown; young twigs reddish brown; leaves oval or ovate, rounded or narrowed at the base, obtuse or acute at the apex, serrate or dentate, with serrulate teeth, dark green and glabrous above, paler and glaucous beneath and pubescent at least along the veins, 5–9 cm. long, 4–6 cm. wide; petioles 1.5–2 cm. long; staminate catkins 3–4 in a short raceme, 6–10 cm. long, in winter purplish brown; pistillate catkins exposed through the winter, 3–4 together, borne below the staminate, expanding before the leaves; fruiting catkin 1–1.5 cm. long, 6–10 mm. thick, scales woody and 5-toothed, about 4 mm. long; samara orbicular or slightly ovoid, without wings but with thin margins. (*Incána*, very gray.)

In wet soil, usually along shores of lakes or banks of streams, common throughout the northern half of the state and southward as far as Minneapolis and St. Paul, infrequent southward to Houston County. From Newfoundland to Saskatchewan south to New York, Pennsylvania, and Nebraska, also in Europe and Asia. Flowers in April and May, fruit ripe in autumn.

FAGACEAE BEECH FAMILY

Trees or shrubs, with alternate, simple, often deeply lobed or cleft leaves; flowers small, monoecious; the staminate in pendulous or erect catkins, the pistillate solitary or several together, subtended by an involucre of united bracts which becomes a bur or cup in fruit; staminate flowers with 4–7 sepals; petals 0; stamens 4–7 sometimes 8–14; pistillate flowers with a 4–6-lobed calyx, adnate to the ovary; petals 0; ovary inferior 3–6-celled; styles as many as the cells of the ovary; ovules 1–2 in each cell; fruit a 1-seeded nut.

A family of about 400 species of temperate and tropical regions. Only the following genus occurs in Minnesota.*

* The beech, *Fagus grandiflora* Ehrh., has been reported in Minnesota, but up to date there is no evidence of its occurrence within the state. It is a large tree with very smooth, light-gray bark, and thin but firm, unlobed, distantly toothed leaves. The staminate flowers are in stalked globular clusters appearing with the leaves; the fruit consists of 2–4 three-cornered nuts surrounded by a bur-like involucre.

A few specimens of the chestnut, *Castanea dentata* Borkh., have been planted in the extreme southeastern corner of the state. It is a tree with scaly bark, and elliptic-lanceolate, strongly toothed leaves. The catkins (wholly staminate, or with a few pistillate flowers near the base) are produced in midsummer, and are very conspicuous, 15–20 cm. long, golden yellow at anthesis; the fruit consists of several large, flattened ovate nuts surrounded by a bur-like involucre about 5 cm. in diameter; the seeds are very sweet and edible, particularly when roasted.

1. QUERCUS L. Sp. Pl. 994. 1753.

OAK

Trees or sometimes shrubs; leaves deciduous, withering persistent or (in some species of warm climates) evergreen, alternate, 5-ranked, simple, pinnately veined, variously shaped, often lobed, furnished with small deciduous stipules; buds covered with numerous scales; flowers monoecious, apetalous, in all our species appearing with the leaves in spring, the staminate in catkins, clustered from scaly buds of the past year's growth, and also from the lower nodes of the new growth; sepals 4–7, petals 0; stamens 4–12; pistil 0; the pistillate solitary or in small clusters, in the axils of the leaves of the new growth; sepals 6, united; petals 0; stamens 0; pistil 3-parted; ovary inferior, nearly 3-celled; ovules usually 6; stigmas 3; each pistillate flower surrounded by a cup-like involucre of many small, concrescent scales; fruit (acorn) a nut surrounded at the base by a cup-like involucre; seed solitary, without endosperm, the large embryo with thick, elliptical cotyledons which remain within the nut during germination. (*Quércus*, the classical Latin name of the oak.)

A genus of about three hundred species native of the warm parts of the north temperate zone and of the adjacent tropical mountains. About fifty species occur in the United States, twenty-two of which occur in the eastern half of the country. Many oaks are valuable for their hard, strong wood, the astringent bark of several species is used in tanning leather, and the outer bark of two species from southwestern Europe and northern Africa furnishes the cork of commerce.

In cultivation oaks are raised from seed. After cutting they renew themselves by the growth of shoots from the stumps.

1. Leaves acutely lobed, the lobes bristle-pointed; acorns ripening the second autumn. Black Oaks.
   a. Leaves dull green, their lobes cut about half way to the midrib.
      (1) Acorn cup cup-shaped, covering about one third of the acorn 1. *Q. borealis*
      (2) Acorn cup saucer-shaped, covering only the base of the acorn 1a. *Q. borealis* var. *maxima*
   b. Leaves glossy, their lobes cut about three-fourths of the way to the midrib; acorn cup covering one-third to one-half the acorn.
      (1) Scales of acorn cup appressed, glabrous or somewhat puberulent, leaves thin but firm.
         (a) Acorn nearly round, scales of cup acute; autumn foliage scarlet; staminate catkins 8–10 cm. long 2. *Q. coccinea*
         (b) Acorn usually elongated, scales of cup obtuse or truncate; autumn foliage brown; staminate catkins about 4 cm. long 3. *Q. ellipsoidalis*
      (2) Scales of acorn cup loose, silky pubescent; leaves coriaceous, thick 4. *Q. velutina*

2. Leaves with rounded lobes or merely crenate-dentate, lobes and teeth not bristle-tipped; acorns ripening the first autumn. WHITE OAKS.
   a. Leaves deeply round-lobed.
      (1) Leaves dull, glabrous; acorn cup not fringed — 5. *Q. alba*
      (2) Leaves glossy above, hairy below; acorn cup fringed.
         (a) Acorn cup 2.5–5 cm. in dm. — 6. *Q. macrocarpa*
         (b) Acorn cup 1–2 cm. in dm. — 6a. *Q. macrocarpa* var. *olivaeformis*
   b. Leaves shallowly lobed; acorn cup fringed, peduncled — 7. ×*Q. Schuettii*
   c. Leaves crenate or crenate-dentate, not lobed.
      (1) Tree, leaves broadly rhombic-obovate, rounded or obtuse, acorns long peduncled — 8. *Q. bicolor*
      (2) Shrub or small tree, leaves oblanceolate, acute, acorns short peduncled — 9. *Q. prinoides*

1. **Quercus borealis** Michx. f. N.A. Sylv. 1: 98. 1817.

NORTHERN RED OAK

Q. rubra var. *ambigua* (Michx. f.) Fernald.

Large tree, 12–24 m. high, 3–10 dm. in diameter, trunk straight, limbs spreading, not gnarled; bark of limbs and small trunks smooth, gray, of large trunks fissured, with broad flat-topped ridges, grayish brown; buds thick, pointed at the top, narrowed at the base, 5 mm. long, 3 mm. wide, glabrous except at the top; leaves 10–18 cm. long, 7–16 cm. wide, widest about the middle, lobed about half way to the midrib into several broad, triangular, acute, bristle-pointed lobes, each lobe having usually two or three narrow, bristle-tipped teeth near its outer end, apex of leaf acute, bristle-pointed, base rounded or broadly wedge-shaped, upper surface dull dark green, glabrous, lower surface paler, glabrous or with small tufts of brownish hairs in the axils of the large veins; petioles 2–4 cm. long; young leaves pink and covered with light down, soon glabrate and changing to a deep bronze color, which is maintained until they are nearly full grown; autumn coloration red; flowers opening when the leaves are about half grown; staminate catkins slender, 4–10 cm. long, flowers scattered, often short-pedicelled, about 3 mm. in diameter; acorns ripening the second year, solitary or in pairs, sessile or borne on stalks 5 mm. long or less; acorn ovoid or cylindric, pale brown, lustrous, more or less downy towards the ends, 1.5–2.5 cm. long, 1–2 cm. wide, seed very astringent; cup cup-shaped, covering about one-third of the acorn, the scales closely appressed, small, ovate, acute, dark brown with a darker margin, puberulent. (*Boreālis*, northern.)

Throughout the forested parts of the state even to the extreme northeast corner, less common southward than the following variety. Nova Scotia and New Brunswick to Minnesota, south to Pennsylvania and Iowa, and in the mountains to North Carolina.

1a. Q. borealis var. **maxima** (Marsh.) Ashe, Proc. Soc. Am. Forest. 11: 90. 1916.

COMMON RED OAK

Q. rubra β L. Sp. Pl. 996.
Q. rubra Du Roi and all later authors, not L.

A somewhat larger tree (in the eastern states occasionally 45 m. high), differing from the species in having a larger, broad-based acorn 2–3 cm. long, 1.5–2 cm. wide, and a very flat saucer-shaped cup that covers only the base of the acorn. (*Máxima*, largest.)

QUERCUS BOREALIS VAR. MAXIMA QUERCUS VELUTINA

Throughout the forest regions of the state, most abundant and largest in the rich calcareous clays of the Big Woods where it is one of the dominant trees. Quebec to Minnesota and Nebraska, south to Georgia, Mississippi, and Oklahoma.

Wood light reddish brown, hard, strong, coarse, weight 41 lbs., used for construction and finish of houses, cheap furniture, and for fuel. On account of its coarse grain

and liability to crack in drying, the wood of this species and of others of the black oak class is much less valuable than that of the white oaks.

Cultivated as an ornamental tree both in this country and in Europe, and making more rapid growth than most of the oaks, frequently having a second growing season in July when the bronze-colored new leaves make a beautiful contrast to the deep green of the mature foliage. The red oak and other species of the black oak class have comparatively shallow and fibrous roots. They are, therefore, easily transplanted, but are also easily injured by grading operations, the trampling of cattle, and similar disturbances of the surface soil. This often leads to the erroneous impression that they will not thrive in cultivation.

2. **Quercus coccinea** Muench. Hausv. 254. 1770.

SCARLET OAK

Tree 10–20 m. high, 3–6 dm. in diameter, occasionally larger; bark rather smooth, divided by shallow fissures into irregular ridges and plates, dark brown or grayish, inner bark reddish; buds oval, acute, 3–5 mm. long, 1.5–3 mm. wide, slightly hairy towards the top; leaves thin and firm 8–12 cm. long, 7–11 cm. wide, widest about the middle, deeply cut into about seven lobes, the lobes mostly 2–4-toothed, all the ultimate divisions long bristle-pointed; apex acute, bristle-pointed, base truncate or very broadly wedge-shaped, upper surface bright green, very glossy, glabrous, lower surface somewhat paler, less glossy, glabrous except sometimes with small tufts of hair in the axils of the large veins; petioles 2.5–4 cm. long; young leaves bright red, loosely pubescent above, silvery tomentose beneath, soon becoming green and glabrate; autumn coloration bright scarlet; flowers opening when the leaves are about half grown, staminate catkins slender, glabrous or somewhat pubescent, 8–10 cm. long, flowers scattered, about 2.5 mm. in diameter, the stamens much longer than the sepals, pistillate flowers mostly on peduncles about 1 cm. long, stigmas about 1 mm. long; acorns ripening the second year, solitary or in pairs, usually peduncled; acorn oval, hemispheric, or slightly elongated, 1.5–1.8 cm. long, about 1.3 cm. wide, light reddish brown, often slightly downy, seed pale yellow, bitter; cup turbinate, about 1.8 cm. wide, narrowed at the base, covering one-half to one-third of the acorn, its scales closely appressed, thin or somewhat thickened, deltoid lanceolate, acute, light reddish brown, glabrous or slightly puberulent. (*Coccínea*, scarlet, referring to the autumn foliage.)

Acid soil, common in the southeastern part of the state, and sparingly northwestward as far as the Twin Cities and Wright County. Less common than the following species with which it has been much confused. Maine to Minnesota, south to Georgia and Oklahoma.

Easily grown from seed and transplanted. A useful ornamental tree on account of its beautiful autumn foliage. Wood reddish brown, hard, strong, coarse, weight 42 lbs.; little used, except for fuel.

3. **Quercus ellipsoidalis** E. J. Hill, Bot. Gaz., 27: 204. 1899.
NORTHERN PIN OAK, HILL'S OAK, "BLACK OAK"

Tree 10–20 m. high, 3–6 dm. in diameter or often low and almost shrub-like; bark at first smooth, later roughened and divided by shallow fissures into large plates, dark brown or blackish, branches dark gray, inner bark light yellow; buds rounded or pointed 1–3 mm. long, .75–1.5 mm. wide; nearly glabrous; leaves thin and firm, 7–14 cm. long, 7–12 cm. wide, widest at or above the middle, deeply cut into about five lobes, the lobes again lobulate or deeply cut or toothed, the ultimate divisions all acute and

QUERCUS COCCINEA QUÉRCUS ELLIPSOIDALIS

bristle-pointed; apex acute, bristle-pointed, base truncate or very broadly wedge-shaped, upper surface bright green, glossy, glabrous, lower surface somewhat paler, less glossy, glabrous except usually with small tufts of hairs in the axils of the large veins; petioles 2.5–4 cm. long; young leaves with but a trace of red, pubescent above, silvery tomentose below, half-grown leaves very pale, rather tardily glabrate; autumn coloration brown, sometimes with blotches of purplish red, leaves persisting throughout the winter; flowers opening when the leaves are about half grown; staminate catkins pubescent 3.5–4.5 cm. long, flowers rather crowded, about 2.5 mm. in diameter, the stamens about the length of the sepals; pistillate flowers

short-peduncled; stigmas about 2 mm. long; acorns ripening the second season, solitary or in pairs, borne on peduncles 1 cm. or less in length; acorn ellipsoidal or nearly globose, 1.3–2 cm. long, about 1 cm. wide, light brown, usually striped with darker lines, slightly downy or glabrous; seed bitter; cup turbinate, narrowed at the base, about 1.4 cm. wide, covering one-third to one-half of the acorn, its scales closely appressed, thin, ovate, obtuse or truncate, slightly pubescent. (*Ellipsoidális*, ellipsoidal, referring to the shape of the acorns.)

Very abundant on acid, sandy soils throughout the wooded districts of the state except in the northeast corner, rare in the groves of the prairie districts, and apparently not reaching the western border of the state. This is the common "black oak" of the region about the Twin Cities. In the east central part of the state it covers large areas of sterile, sandy soil with a copse-like growth. Southern Michigan to Manitoba, south to Illinois and Iowa. Wood light brown, strong, coarse, heavy, used only for fuel.

Quercus palustris Muench., the true pin oak, is rarely planted in Minnesota. It has leaves somewhat resembling those of *Q. coccinea* but tending to be longer and narrower, with wider, square-bottomed sinuses between the lobes. The acorn resembles a miniature red-oak acorn a trifle over 1 cm. in diameter. It is native from Massachusetts to Michigan and southwards.

4. **Quercus velutina** Lam. Encycl. 1: 721. 1783.

BLACK OAK

Large tree 12–24 m. high, 6 dm.–1.2 m. in diameter (occasionally much larger in the Ohio Valley); bark dark brown or nearly black, ridged, scaly, inner bark orange; buds angled, rounded or obtusely pointed, 3–10 mm. long, 2–6 mm. wide, hoary tomentose; leaves thick, coriaceous, 8–17 cm. long, 10–15 cm. wide, variable in shape, but usually widest about the middle, deeply divided into five or seven lobes, the lobes again lobulate or more or less deeply toothed, all the ultimate divisions very acute and bristle-pointed; apex of leaf acute, bristle-pointed, base truncate or very broadly wedge-shaped, upper surface dark green and glossy, glabrate, lower surface yellowish or brownish, more or less pubescent with axillary tufts of brown hairs, rarely nearly glabrate; petioles 3.5–6 cm. long; young leaves crimson, pubescent above, silvery tomentose below; when half-grown golden green and still conspicuously pubescent; autumn coloration brown, dark orange, or dull red, the leaves persisting far into the winter; flowers opening when the leaves are half grown, staminate catkins 8–18 cm. long, hairy; flowers about 4 mm. in diameter, reddish brown, the stamens apiculate, about half again as long as the sepals; acorns ripening the second year, solitary or in pairs, sessile or short-stalked, ovoid-oblong to hemispheric, 1.2–1.8 cm. long, 1.1–1.7 cm. wide, dark brown, covered with whitish down; cup turbinate about 2 cm. broad, covering one-third to one-half of the acorn, scales large,

loose, thin, light brown, covered with a satiny pubescence, the tips of the upper scales free and spreading. (*Velútina*, velvety, referring probably to the acorn cups.)

Very abundant with shell-bark hickory on dry, non-calcareous soils in the southeast corner of the state, occurring as far north as Lake Pepin; not occurring in the vicinity of the Twin Cities nor in the central and northern parts of the state. Maine to Minnesota and Nebraska, south to Florida and Louisiana.

Wood reddish brown, hard, strong, coarse, weight 44 lbs.; little used, except for fuel. Bark used for tanning, as a yellow dye, and medicinally as an astringent.

5. Quercus alba L. Sp. Pl. 1753.

WHITE OAK

Large tree 15–20 m. high, 1–1.5 m. in diameter (in the Ohio Valley sometimes 30 m. high, and 2–3.5 m. in diameter); bark pale gray, scaly but not deeply fissured; buds ovate, blunt, slightly hairy, about 3 mm. long; leaves crowded towards the ends of the twigs, 7–16 cm. long, 3.5–12 cm. wide, widest about the middle, rather uniformly lobed half way to the midrib or deeper into about seven rounded, oblique lobes, the middle lobes largest and sometimes slightly lobulate, the depth of the lobing and the width of the lobes varying greatly in different individuals; apex of leaf rounded, base wedge-shaped, upper surface light dull green, glabrous, lower surface pale, veiny, glabrous; young leaves bright red above, pale below and soft pubescent, when half grown silvery white; autumn coloration purple-red, the leaves persisting far into the winter; petioles 1–2 cm. long; flowers opening when the leaves are about half grown; staminate catkins 7–8 cm. long, very slender, flowers scattered about 2.5 mm. in diameter, yellow; pistillate flowers in clusters of two or three on a peduncle about 5 mm. long, or nearly sessile, bright red; acorns ripening the first season, sessile or on slender peduncles 1–3 cm. long; acorn oblong-ovoid 2.2–3 cm. long, 1.4–2 cm. wide, pale brown, glossy; seed sweet and edible; acorn cup finely downy, covering one-fourth to one-third of the acorn, its scales firm and broad, the lower ones much thickened, the upper thin, not forming a fringe. (*Álba*, white, referring to the pale leaves and bark.)

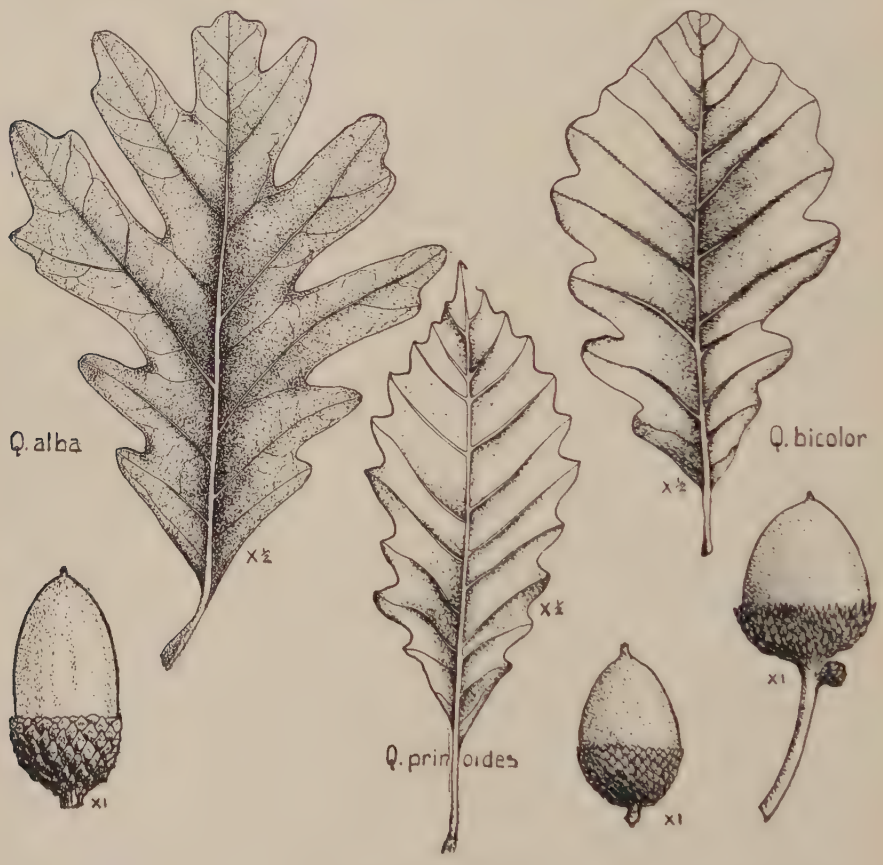
Abundant in southeastern Minnesota and as far north as the Twin Cities, often forming considerable woodlands almost to the exclusion of other trees, less abundant northwards to the latitude of Mille Lacs and northwestward to a little beyond St. Cloud, absent from the northern and western parts of the state. Throughout the state it occurs on heavy, well-drained, acid soils, avoiding calcareous soils. In the Big Woods it occurs in but a few stations near the eastern margin. Maine to Minnesota, south to Florida and Texas.

Grown from seed, the acorns germinating within a few weeks of their ripening and producing a long tap-root before winter. Oaks of the white oak group are very deep rooted, and difficult to transplant after they pass the seedling stage, on the other hand,

they are far less sensitive to disturbance of the surface soils than are the black oaks. Despite its slow growth the white oak is such a fine and permanent tree that it should be planted wherever the soil is suitable. In calcareous soils it is completely useless.

Wood light brown, hard, durable, weight 46 lbs.; one of our most useful woods for heavy construction, ship building, railway ties, interior finish of houses, furniture, etc., also much used for fuel. The "white oak" lumber of commerce is obtained indiscriminately from this and the two following species; bark astringent, used for tanning and in medicine.

Hybrids apparently occur occasionally between this species and *Q. macrocarpa* var. *olivaeformis*. They have the leaf form of *Q. alba*, but with more or less stellate pubescence on the lower side of the leaves. So far as has been noted in this state, they are sterile. They are quite infrequent, as the parents are seldom found growing in close proximity to one another, and in ordinary seasons, they bloom about a week apart. Whether or not this is the form described from Vermont and Pennsylvania as ×*Q. Bebbii* is unknown at the present.



QUERCUS ALBA QUERCUS PRINOIDES QUERCUS BICOLOR

6. Quercus macrocarpa Michx. Hist. Chênes, no. 2. 1801.

BUR OAK

Large tree 10–25 m. high, 3 dm.–1.5 m. in diameter (in the Ohio Valley sometimes twice this size) or under unfavorable situations stunted and sometimes barely 2 m. high, branches very strong and gnarled, producing in open-grown trees an irregular and widely spreading crown, in dense forest often with a tall, straight trunk and short branches; bark dark grayish

Staminate and Pistillate Flowers of Quercus macrocarpa

brown, rough, heavily ridged and fissured, the twigs and smaller branches often with prominent corky wings; buds rounded, pubescent, about 2–3 mm. long; leaves crowded at the extremities of the twigs, thick and firm, 7–18 cm. long, 4–6 cm. wide, very variable in shape, irregularly round lobed, usually most deeply lobed about the middle, broadest and much less deeply lobed above the middle, on some trees very slightly lobed, on others cut almost to the midrib; apex of leaf rounded, base wedge-shaped, upper surface glossy

dark green, glabrous or slightly pubescent, lower surface paler, sometimes silvery white, tomentose with stellate pubescence; young leaves pale golden green, densely woolly pubescent; autumn coloration dull yellowish brown; flowers opening when the leaves are about one-fourth grown; staminate catkins 6–15 cm. long, pubescent; flowers green, about 1.5 mm. in diameter; pistillate flowers usually in pairs, sessile or short peduncled, reddish; acorns ripening the same autumn, solitary or in pairs, sessile or peduncled, very variable in size and form, in typical *Q. macrocarpa* 1.8–5 cm. long, 1.5–3.5 cm. wide, ellipsoidal or broad-ovoid, with rounded, obtuse, or usually depressed apex; seed somewhat bitter; acorn cup thick, 2.5–5 cm. in diameter, hoary tomentose, often nearly covering the nut, its scales tuberculate thickened, appressed, but those near the rim furnished with long slender awns forming a conspicuous, matted, fringe-like border. (*Macrocárpa*, large-fruited.)

The typical large-fruited form occurs sparingly in the extreme southeastern corner of the state. North Carolina to Oklahoma and Texas, and northward, the exact northern limits of the typical form rather doubtful.

6a. **Q. macrocarpa** var. **olivaeformis** (Michx. f.) Gray, Man. Bot. ed. 2, 404. 1856.

NORTHERN BUR OAK

Q. olivaeformis Michx. f. Hist. Arb. Am. 2: 32. 1812.

Acorns 1–1.5 cm. long; acorn cup thin, less than 2 cm. in diameter, the fringe at its border sometimes sparse; staminate catkins 2–6 cm. long, the anthers nearly sessile. (*Olivaefórmis*, olive-shaped, relating to the shape of the acorns.)

This common northern variety of the bur oak seems to be quite sharply separated from the large-fruited southern form, at least in Minnesota. Its most distinguishing pecularities are its relatively small acorn, and much thinner and smaller acorn cup. Even when the acorns themselves are of nearly the same size the whole fruit of the northern form is only about half as large as that of the southern. It is here identified somewhat doubtfully with Michaux's *Q. olivaeformis*, which appears to be a rather extreme form of the northern variety. The acorn figured by Michaux is of the northern type though rather unusually long and narrow. However, it can be very closely matched on occasional trees. The very deeply and narrowly lobed leaves described and figured by Michaux are characteristic of a rather small minority of individuals in Minnesota, the great majority having leaves very similar to the typical large-fruited form. It seems questionable how much importance can be attributed to this character, particularly in a species with such variable foliage. Quite probably it represents an extreme case of individual variation. No correlation has been found to exist between leaf form and fruit characters, nor does the deeply lobed form seem to have any peculiar geographical range but occurs more or less throughout the range of the species.

The common Minnesota tree has twigs greenish gray in color, becoming nearly glabrate by the end of the first season, and usually developing corky ridges when three

or four years old, but occasionally becoming corky the first season, and on other trees remaining smooth for many years and simulating *Q. alba*. In a small number of trees, the twigs are pale orange, resembling the typical form. The buds are smaller than in typical *Q. macrocarpa*, about 2 mm. long, with several buds crowded together at the end of the twig. The leaves are stellate pubescent beneath but usually less tomentose than in the typical form, and rarely much whitened; their autumn coloration is a peculiarly dead gray-brown, and they are the first to fall of any of our oaks. The varieties of this species are in need of intensive study.

Throughout the state except in the extreme northeast corner. In the central part to the state it forms extensive open woodlands on light calcareous soils, it also occurs

QUERCUS MACROCARPA

on the richest and heaviest soils of the state in the Big Woods district, and when relieved of the competition of the white oak, flourishes even on somewhat acid clay. Much reduced in size, it forms small groves and thickets along the edge of the prairies. Nova Scotia to Manitoba and Montana, south to New York and Iowa.

Grown from the acorns, which germinate very freely. Its slow growth during its early years in our climate and the difficulty of transplanting saplings of any considerable size have prevented this tree from being planted to any great extent. It was naturally the most abundant tree in the vicinity of Minneapolis, and care should be tkaen to raise young trees to take the place of the old native specimens when they die, as it is one of our finest ornamental trees.

Wood light brown, hard, very strong and tough, durable, weight 46.5 lbs.; it is somewhat stronger than white oak, has the same uses as the latter and is not distinguished from it commercially. One of our most valuable timber trees.

7. ×Quercus Schuettii Trel. Am. Phil. Soc. 59: 51. 1917.

Q. bicolor×*macrocarpa* (var. *olivaeformis?*).

Leaves intermediate between the two species, shallowly lobed, acorns peduncled, the cup but slightly fringed. (*Schuéttii*, named for J. H. Schuette of Green Bay, Wisconsin.)

This hybrid appears to be fairly common in certain places in the vicinity of the Twin Cities where both parents occur. Sometimes it approaches more closely to one species, sometimes to the other. Nothing is known further of its distribution in the state. Originally described from Brown County, Wisconsin, occurring also in the vicinity of Montreal, and Rochester, New York.

8. Quercus bicolor Willd. Neue Schrift. Ges. Nat. Fr. Berlin, 3: 396. 1801.

SWAMP WHITE OAK

Quercus platinoides Sudworth, 1892.

Tree 10–20 m. high, 6 dm.–1 m. in diameter (sometimes considerably larger in New York, Ohio, and other parts of the east); bark of trunk grayish brown, ridged and furrowed, bark of twigs ragged, and irregularly peeling; buds rounded, 2 mm. long, nearly smooth; leaves often crowded at the extremities of the twigs, rhombic-ovate in outline, broadest a little above the middle, 7–18 cm. long, 3.5–11.5 cm. wide, coarsely crenate-dentate, or with shallow, somewhat acute lobes, leaves of exposed branches thick, dark green above, densely white tomentose below with short stellate hairs, leaves of lower shaded branches much thinner, pale green on both sides, sparingly pubescent below; young leaves bronze-green, silvery pubescent beneath; autumn coloration rich golden brown, the leaves rather tardily deciduous; flowers opening when the leaves are about one-third grown; staminate catkins about 6 cm. long, slender, flowers scattered, about 2.5 mm. in diameter; pistillate flowers in few-flowered, long-peduncled clusters; acorns ripening the first season, solitary, paired, or in clusters of three, borne on slender peduncles, 3–7 cm. long; acorn 2–3 cm. long, 1.5–2 cm. wide, light brown, slightly downy above; cup cup-shaped, one-third to one-half as long as the acorn, pubescent, its lower scales thickened, upper ones loose and some of them often with thread-like tips forming a fringe about the acorn, but never so prominently as in bur oak. (*Bicolor*, two-colored, referring to the dark green and white of the leaves.)

In Minnesota it is common in the river bottoms of the extreme southeastern corner of the state and occurs, though rarely, as far north as St. Paul, also in the

southern part of the Minnesota Valley. Reports of this species from north of the Twin Cities are probably erroneous. Moist soil, Maine to Minnesota, Georgia, and Arkansas.

Wood light brown, hard, strong and tough, durable, weight 47.5 lbs., with the same uses and properties as white oak and bur oak. This wood is not distinguished from them commercially.

9. Quercus prinoides Willd. Neue Schrift. Ges. Nat. Fr. Berlin, 3: 397. 1801.

CHINQUAPIN OAK

Shrub or small tree 2–5 m. high, up to 1 dm. in diameter; bark light brown, scaly; buds rounded, slightly hairy, 2–3 mm. long; leaves oblanceolate, broadest above the middle, 4–12 cm. long, 2–5 cm. wide, sharply and coarsely toothed, apex acuminate, base wedge-shaped, upper side light green and glossy, with a few scattered stellate hairs, lower side pale, densely hairy; petioles 0.5–2 cm. long; staminate catkins about 4 cm. long; pistillate flowers sessile or short-peduncled; acorns ripening the first season, sessile or borne on peduncles about 1 cm. long, elliptical, 1.5–2 cm. long, 1–1.5 cm. wide, light brown, downy towards the top; cups pubescent, about one-third as long as the acorn, the basal scales thickened and prominent. (*Prinoides*, prinos-like, referring to its resemblance to *Q. prinos*.)

In Minnesota it is known to occur only on bluffs in the extreme southeast corner of the state. Specimens in the herbarium of the University have leaves somewhat intermediate in character between this species and *Q. Muhlenbergii* Engelm. with 8–10 teeth on each side of the leaf, the lower side of the leaves silvery white, the unripe acorns with peduncles about 1 cm. long. Reports of the presence of *Q. Muhlenbergii* in the state appear to be based on this form. More study is needed of the western forms of this species. Maine to Nebraska, south to North Carolina and Texas.

ULMACEAE ELM FAMILY

Trees or shrubs with simple, alternate leaves; flowers perfect or monoecious or polygamous, clustered or the pistillate solitary; sepals 3–9, often united; petals 0, stamens as many as the sepals and opposite them; carpels 2, styles or sessile stigmas 2; ovary mostly 1-celled, superior; ovule 1, pendulous; fruit a samara, drupe, or nut. A family of 13 genera and about 140 species, widely distributed in temperate and tropical regions.

1. Leaves pinnate with numerous, subequal lateral veins; flowers appearing before the leaves; fruit a winged samara ..... 1. *Ulmus*
2. Leaves usually 3-nerved from the base, flowers borne on the new growth with the leaves; fruit a drupe ..... 2. *Celtis*

1. ULMUS L. Sp. Pl. 225. 1753.

ELM

Trees, leaves alternate in two ranks, simple, mostly doubly serrate, pinnately veined with a large number of rather uniform lateral veins leaving the midrib at a wide angle, short-petioled, usually oblique at the base;

stipules early deciduous; flowers in clusters, small, appearing before the leaves from special buds; calyx campanulate, usually somewhat oblique, consisting of 4–9 united sepals, petals wanting, stamens 4–9, opposite the sepals; carpels 2, united, ovary 1–2–celled, styles 2, divergent, stigmatic along the inner edge; fruit a 1-seeded round or elliptical samara. (*Ulmus*, the classical Latin name for the elm.)

A genus of 26 species of the north temperate zone and the mountains of tropical Asia.

KEY TO THE SPECIES BASED ON FLOWERS AND FRUIT

1. Pedicels much longer than the flowers; margin of samara ciliate.
   a. Flowers in racemes; samara large, its surface pubescent 1. *U. racemosa*
   b. Flowers in umbel-like clusters; samara small, its surface smooth 2. *U. americana*
2. Pedicels short, flowers in dense clusters; wing and margin of samara smooth.
   a. Bud scales conspicuously brown-hairy; nutlet pubescent with rusty brown hairs 3. *U. fulva*
   b. Bud scales nearly glabrous except along the ciliated margin; samara wholly glabrous.
      (1) Buds nearly spherical, bud scales entirely glabrous except the ciliated margins; nutlet in the center of the samara 4. *U. pumila*
      (2) Buds pointed, bud scales obscurely pubescent; nutlet above the center of the samara 5. *U. campestris*

KEY TO THE SPECIES IN SUMMER CONDITION

1. Upper surface of leaf very rough.
   a. Leaves folded along the midrib; inner bark mucilaginous 3. *U. fulva*
   b. Leaves flat; inner bark astringent 2. *U. americana*
2. Upper surface of leaf nearly or quite smooth.
   a. Leaves small, the largest not over 7 cm. long, nearly equal at the base 4. *U. pumila*
   b. Leaves larger, distinctly unequal at the base.
      (1) Twigs with prominent corky ridges; native tree 1. *U. racemosa*
      (2) Twigs without corky ridges.
         (a) Young twigs nearly glabrous; under surface of leaves practically glabrous except for tufts of hairs in the axils of the veins; cultivated European tree 5. *U. campestris*
         (b) Young twigs pubescent; under surface of leaves with numerous scattered short hairs; native tree, very frequently planted 2. *U. americana*

1. Ulmus racemosa Thomas, Am. Journ. Sci. 19: 170. 1831.

CORK ELM, ROCK ELM

U. Thomasii Sarg. Silva, 14: 102. 1902.

A large tree with a somewhat cylindrical or conical top, 12–20 m. high and 5–10 dm. in diameter; bark of trunk dark gray, ridged, bark of small branches frequently winged with heavy corky ridges, young twigs somewhat

pubescent; buds short-cylindrical, bud scales ciliate along the margin, surface sparsely pubescent; leaves elliptical or somewhat obovate, unequal, rounded, or more or less cordate on one or both sides, apex acute or short acuminate, 5–13 cm. long, 4–7 cm. wide, nearly or quite glabrous above, short pubescent beneath, doubly serrate; petiole short; stipules deciduous; flowers in loose racemes, appearing before the leaves; pedicels 4–7 mm. long; calyx broadly turbinate or campanulate, somewhat oblique, 3.5–4.5 mm. long; sepals oblong, free for about 1 mm.; samara obovate, 16-22 mm. long, strongly ciliate and with a short white pubescence covering the faces, beaks short, crossed, nutlet above the center of the samara. (*Racemósa*, racemed, referring to the flower clusters.)

Frequent on bottom lands throughout the southern half of the state. Quebec to Minnesota, south to Nebraska, Kentucky, and New Jersey.

Wood reddish brown, hard, strong, and compact, even heavier and tougher than white elm, and the most valuable elm wood. (See cut, p. 121.)

ULMUS AMERICANA ULMUS FULVA ULMUS PUMILA

(Leaves ×⅔, fruits ×2)

2. Ulmus americana L. Sp. Pl. 226. 1753.

AMERICAN ELM, WHITE ELM, COMMON ELM

A large tree; when growing in the open usually with ascending, wide spreading branches and more or less drooping branchlets, 12-25 m. high

and 5–20 dm. in diameter, often attaining much greater size in the eastern and southeastern parts of the United States; bark of trunk gray and flaky; twigs and branches not corky, young twigs pubescent; buds pointed, bud scales ciliate along the margin, surface sparsely short pubescent; leaves ovate to elliptical, base very unequal, one side usually cordate, the other side rounded or contracted, apex long acuminate, 7–16 cm. long, 4.5–9 cm. wide, upper surface nearly glabrous or moderately rough pubescent, lower surface sparsely pubescent, chiefly along the veins, margin doubly serrate; petiole short; stipules early deciduous; flowers in umbel-like clusters, appearing in early spring before the leaves, pedicels 5–10 mm. long, filiform; calyx turbinate, oblique, 2.5–3 mm. long, sepals blunt, united nearly to the summit; samara elliptical, 9–12 mm. long with 2 prominent converging beaks, margin densely white ciliate, surface glabrous, strongly veined. (*Americána*, American.)

Throughout the state, most abundant in the Big Woods and on river bottoms throughout the southern half of the state. Newfoundland to Manitoba, south to Texas and Florida. The most commonly planted ornamental tree of the state. Wood rather coarse-grained, hard, tough, and strong, splitting with great difficulty.

3. **Ulmus fulva** Michx. Fl. Bor. Am. 1: 172. 1803.

SLIPPERY ELM, RED ELM

A large tree, with the main branches frequently extending out at right angles to the trunk, 12–20 m. high, 5–10 dm. in diameter; bark of trunk gray, rough, inner bark very mucilaginous; twigs and branches not corky, young twigs rough, pubescent; buds rounded, inner bud scales rusty pubescent, becoming very prominent when the buds unfold in the spring; leaves ovate or elliptical, strongly folded along the midrib, base rounded, somewhat unequal, sometimes slightly cordate on one side, apex acuminate, 6–14 cm. long, 4–7 cm. wide, very scabrous above, scabrous pubescent along the veins beneath, margin doubly serrate; petiole short; stipules deciduous; flowers in glomerule-like clusters, appearing before the leaves; pedicels about 2 mm. long; calyx turbinate, very oblique, about 3 mm. long; sepals truncate, united nearly to the summit; samara orbicular or elliptical, 12–20 mm. long, whole samara glabrous except for a tuft of short brownish hairs covering the nutlet, beaks obsolete, nutlet central. (*Fúlva*, red-brown, referring to the buds.)

Frequent throughout the southern half of the state, especially in the Big Woods, less common northward. Quebec to North Dakota, south to Florida and Texas. Wood reddish brown, hard, strong.

The inner bark is frequently chewed and is used in medicine as a demulcent.

4. Ulmus pumila L. Sp. Pl. 226. 1753.

SIBERIAN ELM

A small tree, 5–10 m. high, 1–2 dm. in diameter; bark of trunk dark gray, fissured, branches not at all corky, twigs slender, glabrous; leaf buds small, ovate, rounded at the top, flower buds much larger, globose, bud scales with ciliate margins, otherwise smooth and glossy; leaves elliptical or ovate to slightly obovate, base slightly unequal, rounded, acute at the apex, 3–7 cm. long, 1.5–4 cm. wide, almost completely glabrous, margin doubly serrate; petiole short; stipules deciduous; flowers in glomerule-like clusters, appearing before the leaves, pedicels less than 1 mm. long; calyx narrowly campanulate, scarcely oblique, 3 3.5 mm. long; sepals somewhat spatulate, truncate and ciliate at the apex, free for about 1.5 mm.; samara nearly orbicular, about 1.5 cm. long, glabrous; beaks crossed; nutlet central. (*Púmila*, dwarf.)

Native of eastern Siberia, Manchuria, and adjacent regions, cultivated as an ornamental tree. Planted somewhat in Minnesota and admirably adapted to our climate.

ULMUS RACEMOSA ULMUS CAMPESTRIS

(Leaves and fruits ×⅔)

5. Ulmus campestris L. Sp. Pl. 225. 1753.

ENGLISH ELM

U. glabra Mill. 1768.

A large tree with spreading branches and an oval head, under favorable conditions reaching somewhat larger size than the white elm; bark of trunk gray, corky, deeply fissured into rectangular flakes; branches not corky in the form usually planted in America; twigs mostly glabrous, glossy, brown; buds ovate, the inner bud scales ciliate

along the margin, the surface with a few scattered hairs, the outer nearly or quite glabrous; leaves rhombic-obovate, sometimes nearly elliptical, apex acute or acuminate, base narrowed and somewhat unequal, 5–10 cm. long, 3.5–6 cm. wide, slightly scabrous above, practically glabrate beneath except for tufts of white hairs in the axils of the veins, margin doubly serrate (less sharply and deeply so than in white elm); petiole short; stipules deciduous; flowers in glomerule-like clusters, appearing before the leaves; pedicels less than 1 mm. long; calyx narrowly obconic, scarcely oblique, 2–3 mm. long; sepals oblong, free for about 1 mm.; samara elliptical, orbicular or obcordate, 10–16 mm. long, smooth throughout; beaks crossed; nutlet somewhat above the center of the samara. (*Campéstris*, growing in fields.)

A European tree much planted in the eastern United States and occasionally in Minnesota.

2. CELTIS L. Sp. Pl. 1043. 1753.

HACKBERRY

Trees or shrubs; leaves simple, alternate, 3–5-nerved or in some species pinnately veined; flowers greenish, borne in the axils of the leaves of the season, polygamous or monoecious, the staminate clustered, the pistillate mostly solitary; sepals 4–6, free or somewhat united; petals 0; stamens 4–6 opposite the sepals; ovary 1-celled; stigmas 2, long and pointed, recurved or divergent; fruit an ovoid or globose drupe. (*Céltis*, an ancient name used by Pliny for an African species of lotus.)

A genus of about 60 species, natives of the north temperate and tropical regions.

1. Leaves smooth or nearly so above — 1. *C. occidentalis*
2. Leaves very rough above — 1a. *C. occidentalis* var. *crassifolia*

1. Celtis occidentalis L. Sp. Pl. 1044. 1753.

HACKBERRY

A tree 10–16 m. high, 3–6 dm. in diameter, with a somewhat cylindric to rounded head; bark of trunk grayish brown, much roughened with prominent, short, corky ridges; twigs slender, somewhat zigzag, brownish, shining, glabrous or sometimes slightly pubescent, knotty with prominent bud bases; buds pointed, prominent, bud scales pubescent and ciliate; leaves ovate to rhombic-ovate, base unequal, usually narrowed or sometimes rounded, apex long acuminate, 6–12 cm. long, 4–7 cm. wide, midrib prominent, the lateral veins 5–15, the basal ones prominent, often giving the leaf a 3-nerved appearance, glabrous above, slightly pubescent along the veins beneath, margin serrate in the middle portion, about the lower one-third entire; petiole pubescent, about 1 cm. long; stipules falling as the leaves unfold; flowers appearing with the leaves, the lower staminate, arising in clusters from naked nodes, the upper perfect and solitary in the

axils of the foliage leaves; sepals free, about 2 mm. long; drupe globose, dark purple to nearly black (rarely orange), with a thin, sweet, edible flesh. (*Occidentális*, western, contrasted by Linnaeus to the two old-world species that he describes.)

Probably throughout the southern and western parts of the state. All Minnesota specimens in the herbarium of the University are from the southwestern and west central parts of the state. This species has not been sufficiently collected, and there has been much confusion between the species and the following variety. Quebec to Manitoba, south to North Carolina and Oklahoma. Frequently planted as a street tree but somewhat undesirable as it is almost always afflicted with insect galls, which produce unsightly bunches of short twigs, looking like dilapidated birds' nests. Very sensitive to late spring frosts. Wood light yellow, coarse, weak.

CELTIS OCCIDENTALIS CELTIS OCCIDENTALIS VAR. CRASSIFOLIA

(Leaves ×⅔, flowers ×2)

1a. C. occidentalis L. var. **crassifolia** (Lam.) Gray, Man. Bot. ed. 2. 357. 1856.

C. crassifolia Lam. 1797.

A larger tree, in Minnesota sometimes reaching a height of 25 m. and a trunk diameter of 9 dm.; twigs pubescent; leaves with base unequal, usually cordate, apex acuminate, ovate to ovate-lanceolate, 9–15 cm. long, 4–8 cm. wide, upper surface scabrous-pubescent, lower surface hirsute-pubescent, margin serrate almost to the base, the serrations sharper and coarser than in the species. (*Crassifólia*, thick-leaved.)

Usually on bottom lands, throughout the state and apparently far more common than typical *C. occidentalis*. New Jersey, to South Dakota, south to South Carolina and Colorado. Possibly a distinct species.

MORACEAE MULBERRY FAMILY

Trees or shrubs with milky sap, simple, alternate leaves; flowers monoecious or dioecious, in catkin-like or head-like clusters; sepals 4–5, somewhat united; petals 0; stamens 4–5, opposite the sepals; carpels 2, styles 1 or 2; ovary superior, mostly 1-celled; ovule 1, pendulous; fruit mostly aggregate, the calyx lobes persistent and becoming fleshy.

About 55 genera and 1,000 species, mostly tropical. Only the following genus occurs in Minnesota.

1. MORUS L. Sp. Pl. 986. 1753.

MULBERRY

Trees or shrubs with milky sap; leaves alternate, simple, often lobed, 3-nerved; stipules early deciduous; flowers in axillary catkin-like clusters, the pistillate clusters ripening into a succulent aggregate fruit; staminate flowers with 4 sepals, stamens 4; pistillate flowers with 4 sepals, somewhat united below; ovary 1-celled, stigmas 2, spreading; true fruit an achene which is surrounded by the fleshy persistent calyx. (*Mórus*, the classical Latin name of the mulberry.)

A genus of about 10 species of the northern hemisphere.

1. Leaves rough above, pubescent beneath; fruit purple; native tree — 1. *M. rubra*
2. Leaves glabrous or nearly so; fruit white or pink; cultivated tree — 2. *M. alba*

1. Morus rubra L. Sp. Pl. 986. 1753.

RED MULBERRY

A small tree or a shrub, in Minnesota rarely exceeding 6 m. in height, 1–5 dm. in diameter, in the southern states sometimes much larger; trunk short, dividing into several spreading branches; bark of trunk dark brown, irregularly flaky; twigs rather slender, at first green, finely puberulent, later becoming glabrous and brown or gray; buds conspicuous, ovoid, blunt, bud scales slightly ciliate and puberulent; leaves broadly ovate, occasional leaves deeply and irregularly 3–5-lobed, prominently 3-nerved, more or less cordate or truncate at the base, apex long acuminate, 7–19 cm. long, 6–13 cm. wide, upper surface slightly scabrous, lower surface pubescent, margin rather coarsely serrate; petiole about 2 cm. long; stipules linear-lanceolate, about 1.5 cm. long, deciduous about the time the leaf attains full size; staminate flowers in cylindrical, drooping, catkin-like clusters,

3–4 cm. long, peduncle about 1 cm. long; pistillate clusters spreading, oval-cylindrical, about 1 cm. long, peduncle 0.5–1 cm. long; fruit reddish black, 2.5–4 cm. long, 8–10 mm. in diameter, edible. (*Rúbra*, red, in reference to the fruit.)

Occurs chiefly in rich woods in the southeastern part of the state, occasionally as far northwestward as Hennepin County. Vermont to southern Ontario and South Dakota, south to Florida and Texas. Wood light yellow, soft, weak, but durable in contact with the soil and consequently much used as fence posts.

MORUS RUBRA MORUS ALBA

(Leaves ×⅔, spike ×½, flowers ×1)

2. Morus alba L. Sp. Pl. 986. 1753.

WHITE MULBERRY

A small tree rarely over 6 m. in height, 1–5 dm. in diameter, with gnarled irregular branches; bark of trunk yellowish brown, with irregular sinuous ridges; twigs slender, puberulent when young, soon becoming smooth, light yellowish gray; buds very broadly ovoid, short-pointed, bud scales obscurely ciliate, otherwise glabrous; leaves broadly ovate, often more or less 3-lobed, prominently 3-nerved, acute or acuminate at the apex, mostly cordate at the base, 5–12 cm. long, 3–8 cm. wide, upper surface minutely papillate, otherwise glabrous, lower surface glabrous except for a few hairs along the main veins, margin coarsely and rather bluntly serrate; petiole 2–3 cm. long; stipules very early deciduous; staminate spikes spreading or somewhat drooping, about 1.5 cm. long; peduncles very slender, 0.5 cm. long; pistillate spikes elliptic to globose, about 1 cm. long, peduncles 1 cm. long; fruit oblong to elliptic, about 1.5 cm. long, edible but insipid. (*Álba*, white, referring to the fruit.)

Occasionally planted throughout the southern half of the state. Not entirely hardy, the twigs often killing back during severe winters. Introduced from Asia and occasionally escaping from cultivation. Grown for feeding silk worms.

ARISTOLOCHIACEAE BIRTHWORT FAMILY

Herbs or woody plants, the latter mostly twining vines, with alternate, petioled leaves, for the most part cordate and entire; flowers perfect, mostly

apetalous and epigynous; calyx of 3 sepals more or less completely united, often strongly zygomorphic; petals wanting (rarely 3, rudimentary); stamens 6–36 more or less fused with the pistil, appearing either as free stamens borne on the top of the ovary, or completely united with the style to form a column, anther-bearing below, and stigma-bearing at the summit; pistil compound, consisting of 4–6 carpels; ovary mostly inferior (rarely partially superior) 4–6-celled; styles more or less completely united; stigmas free; fruit a capsule with several–many seeds.

A family of 5 genera and about 200 species of tropical and temperate regions, most abundant in South America. The following is the only woody genus occurring in temperate North America.

1. ARISTOLOCHIA L. Sp. Pl. 960. 1753.

BIRTHWORT

Perennial herbs or woody climbers often of large size with alternate, petioled, heart-shaped or lobed, palmately veined leaves; flowers medium-sized to large, often unpleasantly scented; calyx tubular, variously bent, often with an expanded limb; petals wanting; stamens usually 6, united with the style; carpels 4–6, ovary inferior. (*Aristolóchia*, the Greek name of an herb used in obstetrics, from *aristos*, best and *locheia*, birth.)

About 160 species of wide distribution. The following is the only woody species found in the northern United States.

1. **Aristolochia macrophylla** Lam. Encycl. 1: 255. 1783.

DUTCHMAN'S PIPE

A. Sipho. L'Her. 1784.

A tall twining vine, with main stems up to 3 cm. in diameter; twigs slender, green, glabrous; leaves broadly reniform or orbicular, 15–25 cm. in diameter, palmately veined, apex rounded or short acuminate, base deeply cordate, margin entire, upper surface deep green, glabrous, lower surface grayish green, pubescent when young, becoming glabrate, petioles about 10 cm. long; flowers solitary, or 2–3 from the same axil; calyx tube sharply bent, yellowish green, veiny, about 3 cm. long, the limb 3-lobed, purple-brown, spreading, about 2 cm. in diameter; anthers 6, arranged in pairs; stigma 3-lobed; capsule oblong-cylindric 5–8 cm. long, about 2 cm. in diameter. (*Macrophýlla*, large-leafed.)

Erroneously reported as native to Minnesota; native from Pennsylvania to Georgia and westward to Kansas. Frequently planted as an ornamental vine on porches, etc., perfectly hardy in the latitude of the Twin Cities and very valuable where a dense screen of foliage is desired.

MAGNOLIACEAE MAGNOLIA FAMILY

Trees or shrubs; leaves alternate, entire or lobed, marked with transparent dots; leaf buds covered with membranous stipules; bark bitter and

aromatic; flowers large and solitary; sepals and petals colored alike, arranged in 3's, mostly imbricated in the bud, hypogynous and deciduous; stamens numerous, large, anthers adnate; carpels many, on an elongated or cone-shaped receptacle, free or cohering with each other and in the fruit forming a sort of fleshy strobilus; seeds one or two in each carpel.

A family of about 10 genera and 100 species of wide geographic distribution. The following genus is represented by one cultivated species in Minnesota.

1. MAGNOLIA L. Sp. Pl. 535. 1753.

MAGNOLIA

Trees or shrubs with large, usually thick, entire leaves; leaf buds covered with sheathing stipules; flowers large, fragrant, borne singly at the ends of branches, appearing before or with the leaves; sepals 3, petal-like; petals 6–9, in whorls of 3; stamens imbricated, with short filaments and large anthers; carpels on a cone-shaped receptacle, cohering and forming at maturity an aggregate, cone-like fruit with dry or fleshy follicles that dehisce and let out by slender threads one or two, usually red seeds. (*Mágnolia*, named for the French botanist, Magnol.)

A genus of about 30 species, natives of eastern North America, southern Mexico, and eastern and southern Asia. Several Asiatic species with large white flowers, which open before the leaves appear, are favorite ornamental trees. The following species, planted to some extent in Minnesota, is the only one that endures our climate.

MAGNOLIA ACUMINATA × ½ CLEMATIS VERTICILLARIS

(×⅓)

1. Magnolia acuminata L. Sp. Pl. 536. 1753.

CUCUMBER TREE

A tree about 15–20 m. high, attaining a maximum height farther south of 30 m.; leaf buds silvery gray and silky pubescent; leaves oblong or ovate, acuminate

at the apex, pinnately veined, margin entire, glabrous above, more or less pubescent beneath, 13–24 cm. long, 7–13 cm. wide; flowers somewhat narrowly campanulate, greenish yellow, glaucous, orange-colored within, 4–7 cm. long; fruit-cone about 4–7 cm. long. (*Acuminâta*, pointed, in reference to the leaf.)

Cultivated. Distributed from Pennsylvania and western New York to Illinois, south to Georgia, northern Alabama, and Arkansas; apparently quite hardy in the vicinity of the Twin Cities. Blossoms in June.

BERBERIDACEAE BARBERRY FAMILY

Shrubs or herbs with alternate or basal, simple or compound leaves, with or without stipules; flowers in racemes or solitary; sepals and petals imbricated in the bud, each mostly in 2 whorls of 3 (occasionally 2 or 4 in the whorl); stamens as many as the petals and in front of them or more numerous; anthers usually opening by two valves; carpel 1; styles short; ovules 2–many; fruit a berry or a capsule.

A family of about 10 genera and over 200 species, mainly of the north temperate zone.

The following genus is represented in Minnesota by two cultivated species, one of which has become naturalized.

1. BERBERIS L. Sp. Pl. 330. 1753.

BARBERRY

Shrubs with yellow wood and inner bark, usually spiny; leaves mostly in fascicles, simple or compound; flowers yellow, in drooping racemes or singly from each fascicle of leaves; sepals 6, oblong, with 2–6 acutish, sepal-like bracts on the outside; petals 6, obovate, with two glands at the base; stamens 6, with sensitive filaments closing up around the style when touched; anthers opening by valves; pistil 1, stigma shield-shaped; fruit a 1–few-seeded berry. (*Bérberis*, the Latin form of the Arabic name.)

A genus of about 160 species, natives of North America, Europe, northern Asia, and South America. About 12 species occur in North America.

1. Leaves serrate; flowers and fruits in racemes — *B. vulgaris*
2. Leaves entire; flowers mostly 1 to each leaf-cluster — *B. Thunbergii*

1. Berberis vulgaris L. Sp. Pl. 330. 1753.

COMMON BARBERRY

A spiny shrub, 2–3 m. high, with arching branches, glabrous throughout; leaves alternate or fascicled, obovate or spatulate, obtuse at the apex, cuneate at the base, bristly serrate, glabrous on both sides, prominently reticulate-veined beneath, 2.5–7 cm. long, 0.8–2 cm. wide, a simple or more frequently a triple prolonged spine (modified leaf) below each fascicle; racemes pendulous, terminating the short shoots bearing

the leaves, 4–8 cm. long, many-flowered; flowers yellow, about 8 mm. broad, ill-smelling; petals entire; fruit an oblong berry, scarlet when ripe, acid, persistent through the winter. (*Vulgáris*, common.)

Native of Europe, formerly much planted as an ornamental shrub and hedge plant and naturalized in many parts of the state. The common barberry is the alternate host of the fungus that causes black stem rust of wheat. For this reason it has been outlawed and should be destroyed wherever found. Blossoms in April and May, fruits ripe in autumn.

Several forms have been developed through cultivation, among which the following has been the most commonly planted:

1a. Berberis vulgaris f. atropurpurea Regel.

With purple-colored leaves, otherwise like the species, and equally objectionable.

BERBERIS

2. Berberis Thunbergii. DC. Syst. 2: 9. 1821.

JAPANESE BARBERRY

Low, very dense shrub, 0.5–1 m. high; branches spreading and slightly curved; twigs brown, grooved; leaves in dense fascicles, spatulate, rounded or sometimes

mucronate-tipped at the apex, glabrous throughout, glaucescent beneath, entire, 5–40 mm. long, 2–10 mm. wide, fascicle subtended by a simple spine; flowers 1–3 (mostly 1) terminating the short shoots, yellow with pinkish bracts, 6–8 mm. broad; pedicels 8–10 mm. long; fruit elliptic or ovoid, bright red when ripe, about 8 mm. long. (*Thunbérgii*, named for the botanist Thunberg.)

Native of Japan, planted extensively as an ornamental shrub on account of its dense, spreading growth, its dark red berries, as well as the handsome autumn coloring of the foliage. It is especially well adapted for borders of walks and drives and is perfectly hardy in our climate. It does not act as host for wheat rust, and is entirely unobjectionable. Blossoms in early May, fruit ripe in August.

RANUNCULACEAE BUTTERCUP FAMILY

Herbs or sometimes woody plants, with acrid, usually colorless sap; leaves alternate (opposite in *Clematis*), simple or compound, petioles dilated at the base, sometimes with stipule-like appendages; flowers hypogynous, regular or irregular, polypetalous or apetalous, with sepals often colored like petals; stamens numerous (or rarely few); pistils many, or rarely solitary, 1-celled; ovules 1–many, anatropous; fruit a cluster of achenes or follicles, a single follicle, a berry, or in one genus a capsule.

A family of about 35 genera and 1,200 species, distributed mostly throughout the temperate and frigid zones.

A family well represented in our flora, but only the following genus is woody.

1. CLEMATIS L. Sp. Pl. 543. 1753.

VIRGIN'S BOWER

Climbing vines or erect or ascending perennial herbs, sometimes woody; climbing by bending or twining of the leaf-stalks; leaves opposite, pinnately compound, lobed or in some species entire; flowers solitary or in panicles; sepals 4 or rarely 5, petaloid; petals 0, or as many as the sepals; pistils many; styles long plumose, silky, or naked, persistent; fruit a cluster of achenes. (Gr. *Clématis*, a climbing plant.)

A genus of over 100 species of wide geographical distribution. The greatest number of species occur in the temperate regions. Besides the following, some 20 others occur in the southern and western parts of North America. In addition to the following woody species, several herbaceous species are commonly cultivated in Minnesota.

1. Flowers large, solitary on the old branches; sepals purple — 1. *C. verticillaris*
2. Flowers smaller, numerous, on the year's growth; sepals white.
   a. Leaflets toothed; flowering in summer — 2. *C. virginiana*
   b. Leaflets entire; flowering in autumn — 3. *C. paniculata*

1. Clematis verticillaris DC. Syst. 1: 166. 1818.

PURPLE VIRGIN'S BOWER

Atragene americana Sims, 1806.

A trailing or climbing vine with smooth, angular stems and large nodes; leaves trifoliolate, leaflets ovate, rounded or cordate at the base, acute at the apex, coarsely and evenly serrate, thin, glabrous, 3–6 cm. long, 1.5–3 cm. wide; petioles 2–3 cm. long; flowers axillary, purple, 5–7 cm. broad when expanded; sepals 3–4.5 cm. long, thin and prominently veined, silky hairy along the margin; petals spatulate, 1.2–1.8 cm. long, persistent; styles persistent, becoming plumose and 5–6 cm. long in fruit. (*Verticilláris*, in a whorl, possibly in allusion to the climbing habit.)

Infrequent in rocky woods in the eastern part of the state from the northern boundary to the southern. Distributed from eastern Quebec to Hudson Bay and Lake Winnipeg, south to Delaware, West Virginia, Michigan, and Minnesota. Flowers in May and June, fruits in July and August. (See cut, p. 127.)

CLEMATIS VIRGINIANA CLEMATIS PANICULATA

2. Clematis virginiana L. Amoen. Acad. 4: 275. 1759.

VIRGINIA VIRGIN'S BOWER

A long vine, climbing freely over shrubs and fences; stems furrowed; leaves opposite, trifoliolate; petioles straight and deflexed, or bent and acting as tendrils; leaflets ovate, rounded or cordate at the base, acute or acuminate at the apex, coarsely toothed or sometimes slightly 3-lobed, bright green and glabrous above, paler and sometimes slightly pubescent beneath, 4–9 cm. long, 2–6 cm. broad; flowers in leafy panicles, white, 15–20 mm. broad; styles persistent, becoming 4–5 cm. long in fruit, and forming whitish, feathery plumes on the achenes. (*Virginiána*, Virginian.)

In woods, on river banks, etc., occurring throughout the state, common eastward. Distributed from Nova Scotia to Manitoba, south to Georgia and Kansas. Flowers in June and July, fruits in August and September.

3. **Clematis paniculata** Thunb. Trans. Lin. Soc. 2: 337. 1794.

CLEMATIS

A vigorous climbing vine, climbing over bushes, fences, and trellises; leaves 3–5-foliolate, the first pair of leaves of a shoot usually entire and cordate; leaflets ovate, rounded or mostly cordate at the base, acuminate at the apex, glabrous on both sides, young leaves with blotches of white along the veins, 2.5–5 cm. long, 1.8–3 cm. wide, the widened bases of the petioles connate; flowers in axillary and terminal panicles, white, fragrant, 2.5–3 cm. broad; fruit with persistent, plumose styles. (*Paniculâta*, in a panicle.)

Native of Japan, extensively cultivated as an arbor and trellis plant. Flowers and fruits in autumn (September–October).

MENISPERMACEAE MOONSEED FAMILY

Climbing or twining, woody or herbaceous vines; leaves alternate, palmate or peltate, entire or lobed, stipules lacking; flowers in panicles, racemes, or cymes, small, dioecious; sepals 4–12; petals 6, in two whorls of 3 each, sometimes fewer or none, imbricated in the bud; stamens about the same number as petals; carpels 3–many (mostly 6), ovule one; fruit a drupe, ovary often curving in developing into a fruit, causing the seed to be bent into a crescent.

A family of 55 genera and about 260 species, chiefly of tropical regions, represented in the Minnesota flora by the following genus only.

1. **MENISPERMUM** L. Sp. Pl. 340. 1753.

MOONSEED

Climbing vines with large peltate or cordate, lobed or entire, alternate leaves; flowers in panicles, small, dioecious; sepals 4–8, in two series or whorls; petals 6–8, shorter than the sepals; stamens 12–24; pistils in the fertile flowers 2–4, on a raised receptacle; staminodia usually present; stigma broad and flat; fruit a flattened drupe; seed bent into a crescent, hence the name. (*Menispérmum*, moonseed, from Gr. *mene*, the moon, *sperma*, seed.)

A genus of two species, one in eastern North America, the other in eastern Asia.

1. **Menispermum canadense** L. Sp. Pl. 340. 1753.

MOONSEED

A vine climbing over bushes or fences, 2–4 meters in length; stems slightly pubescent, twining; leaves on long, slender petioles, cordate and

entire or variously 3–7-lobed or angled, mostly peltate near the margin, glabrate above, pubescent beneath, 6–17 cm. long, 7–29 cm. broad; flowers in loose panicles, greenish white; drupe oblong, bluish black; seed crescent-shaped. (*Canadénse*, Canadian.)

In woods and along hillsides and streams. Rather common throughout the state, especially southward. Distributed from western Quebec and western New England to Manitoba and south to Georgia and Arkansas. Flowers in June and July, fruits in autumn.

"The long, slender, bitter, yellow root is used by the Sioux as medicine, being called *Pejuta zizi*; and from this came the name Pejuta zizi or Yellow Medicine River." T. M. Young.

MENISPERMUM CANADENSE

SAXIFRAGACEAE SAXIFRAGE FAMILY

Herbs or shrubs, mostly with alternate, rarely opposite leaves, without true stipules (often with stipule-like sheaths); flowers mostly perfect, rarely polygamo-dioecious, regular or infrequently irregular, hypogynous, perigynous, or epigynous, solitary or in inflorescences of various kinds, sepals 4–5 borne on a more or less developed hypanthium; petals 4–5, rarely wanting; stamens mostly 8–10 (less frequently 4–5) or numerous; carpels mostly 2, rarely 3–5, more or less united or nearly free; ovary 2-celled (rarely 3–5-celled) or frequently 1-celled with 2 mostly parietal placentae; seeds numerous, small, sometimes more or less winged, with copious endosperm.

A family of about 55 genera and 650 species widely distributed but most abundant in the north temperate zone and in the Andes, rare in the tropics.

1. Leaves opposite or whorled, not lobed; stamens more than 5.
   a. Stamens more than 10, flowers white and showy, leaves opposite . . . 1. *Philadelphus*
   b. Stamens 8–10, flowers greenish, outer ones often sterile, leaves mostly in whorls of 3 . . . 2. *Hydrangea*
2. Leaves alternate, lobed; stamens 4–5 . . . 3. *Ribes*

PHILADELPHUS GRANDIFLORUS PHILADELPHUS CORONARIUS

1. PHILADELPHUS L. Sp. Pl. 470. 1753.

SYRINGA, MOCK ORANGE

Shrubs with opposite, simple, toothed or entire leaves; flowers large, white or cream-colored, terminal or axillary, in cymes, racemes or solitary; hypanthium top-shaped adnate to the lower two-thirds of the ovary; sepals 4–5, rounded or obovate; petals 4–5; stamens 20–40; styles free or united below, ovary 3–5-celled; fruit a 3–5-celled capsule; seeds numerous. (*Philadélphus*, from Gr. *Philadelphon*, a sweet-flowering shrub.)

A genus of about 50 species, natives of North America, Asia, and Central Europe. In addition to the following, 6 other species occur in the southern and western parts of North America.

1. Flowers in racemose clusters of 5–9, odorous.
   a. Shrub up to 3–4 m. high; leaves remotely serrate, pubescent beneath 1. *P. coronarius*
   b. Shrubs 1–2 m. high; leaves nearly entire, glabrous beneath 2. ×*P. Lemoinei*
2. Flowers solitary or in short clusters of 3 or rarely 5, nearly scentless, leaves remotely denticulate 3. *P. grandiflorus*

1. Philadelphus coronarius L. Sp. Pl. 470. 1753.

MOCK ORANGE, GARDEN SYRINGA

A shrub 2–4 m. high, with grayish, somewhat shredded bark; young twigs reddish or yellowish brown, glabrous or with a few sparse hairs, peeling during the second season with papery layers; leaves ovate or elliptic, 4–7 cm. long, 2–5 cm. wide, base rounded or narrowed, apex acuminate, margin remotely serrate with 7–10 very small teeth on each side, upper surface dull dark green, glabrous, lower surface paler, rough pubescent at least along the veins, petiole about 5 mm. long, pubescent; flowers in raceme-like clusters with a terminal flower and 2–4 pairs of lateral flowers; pedicles pubescent, about 5 mm. long; flowers cream-colored, very fragrant, 3–4 cm. broad; hypanthium nearly glabrous; sepals lanceolate, 5–6 mm. long, somewhat pubescent within; petals elliptic, 12–16 mm. long, 8–12 mm. wide; stamens 5–6 mm. long, the anthers yellow; styles a little shorter than the stamens, united at the base or sometimes for nearly half their length; fruit a top-shaped capsule 7–10 mm. long. (*Coronárius*, garland-like.)

Native of Europe. Much cultivated as an ornamental shrub, and entirely hardy in Minnesota. As it comes up freely from seed in gardens, it is likely to be found growing spontaneously in Minnesota as it does in some other parts of the United States. Blossoms in June, fruit ripe in August and September.

There are a number of cultivated forms of this species. One with golden yellow leaves (*P. coronarius* var. *aureus*) is frequently planted. There are also a number of garden hybrids of this with other species, and where two species are grown in proximity natural hybrids are likely to appear. The most planted of the hybrids is the following.

2. ×Philadelphus Lemoinei Lemoine, Cat. 1887.

P. coronarius×*microphyllus*.

Shrubs about 2 m. high, the leaves smaller than in *P. coronarius* and nearly or quite entire; pedicels glabrous, hypanthium and sepals pale, glabrous; styles often much shorter than the stamens and united to above the middle. (*Lemoínei*, named for the originator, the French florist, Lemoine.)

A series of garden forms, some of them with double flowers.

3. Philadelphus grandiflorus Willd. Enum. Pl. Hort. Berol. 511. 1809.

LARGE-FLOWERED SYRINGA

A shrub 2–3 m. high, with grayish, somewhat shredded bark; twigs dark reddish brown, glabrous, exfoliating the second or third year; leaves ovate to ovate-lanceolate

6–10 cm. long, 3–6 cm. wide, base narrowed or somewhat rounded, apex acuminate, margin denticulate with 6–8 remote teeth, upper surface dull dark green, glabrous, lower surface somewhat paler, glabrous except for a little pubescence in the axils of the veins; petiole 6–8 mm. long, glabrous; flowers solitary or in 3-flowered cymes at the end of branchlets, rarely with additional flowers in the axils of the uppermost leaves; pedicels glabrous; flowers pure white, scentless, 3–5 cm. broad; hypanthium glabrous; sepals lanceolate, about 1 cm. long, glabrous without, tomentose within; petals broadly ovate, 1.5–2 cm. long; stamens about 1 cm. long; styles rather exceeding the stamens, united nearly to the summit; fruit a top-shaped capsule, 9–12 mm. long. (*Grandiflórus*, large-flowered.)

Native of the southern Appalachian Mountains. Frequently planted as an ornamental shrub and entirely hardy. Flowers in May or early June, about ten days before *P. coronarius*, fruit ripe in August.

HYDRANGEA ARBORESCENS HYDRANGEA PANICULATA

(×⅓)

2. HYDRANGEA L. Sp. Pl. 397. 1753.

HYDRANGEA

Shrubs with opposite or whorled, simple leaves; flowers white or tinged with pink, in terminal, compound cymes, the marginal ones usually sterile

and consisting of a large, membranous, flat, colored calyx, fertile flowers small, hypanthium hemispherical, adnate to the ovary, sepals 4–5, petals 4–5, ovate, stamens 8–10, ovary 2–4-celled, styles 2–4, distinct; fruit a many-ribbed, many-seeded capsule, opening between the styles.

A genus of about 35 species, natives of eastern North America, eastern Asia and the Himalayas, and South America. Three species occur in the southeastern states. (*Hydrángea*, from Gr. *Hydrangeion*, a water vessel, referring to the shape of the capsule.)

1. Leaves opposite, broadly ovate, mostly cordate at base, flower cluster nearly flat-topped 1. *H. arborescens*
2. Leaves mostly in threes, ovate-lanceolate, flower cluster pyramidal 2. *H. paniculata*

1. Hydrangea arborescens L. Sp. Pl. 397. 1753.

A shrub 1–3 m. high (in our climate seldom over 1.5 m.), young twigs pubescent; leaves opposite, broadly ovate to nearly orbicular, rounded or cordate at the base, acute or rounded at the apex, coarsely serrate, glabrate above or with a few scattered rough hairs along the main veins, somewhat pubescent along the veins below, 6–12 cm. long, 4–8 cm. wide; petioles 1–2 cm. long; cyme compound, flattened, 5–25 cm. broad, sterile marginal flowers few or quite numerous (in the cultivated forms often constituting nearly the whole flower cluster), white and showy, becoming green in old age; fruit a 2-beaked capsule. (*Arboréscens*, tree-like.)

Southern New York to Florida, west to Iowa and Missouri; not native in Minnesota. The following variety is frequently cultivated within the state.

1a. H. arborescens L. var. cordata T. & G. f. grandiflora Rehder, Mitt. D. D. G. 16: 71. 1907.

HILLS OF SNOW

Almost all the flowers sterile, leaves cordate at the base.

An excellent ornamental shrub. In the latitude of Minneapolis it is not quite hardy, killing back in severe winters to about the level of the snow. However, as it blossoms on the new growth, this winter-killing is not injurious, though it prevents the shrub from reaching its maximum size here. (*Cordáta*, heart-shaped; *grandiflóra*, large-flowered.)

2. Hydrangea paniculata Sieb. Nov. Oct. Leop. 691. 1829.

A shrub or small tree 1–9 m. high; leaves opposite or mostly in whorls of 3, elliptic or ovate, narrowed at the base, acuminate at the apex, serrate, pubescent with stiff, scattered hairs above, more densely and finely pubescent on the veins beneath, 5–12 cm. long, 4–6 cm. wide; petioles less than 1 cm. long; cymes terminal, 9–30 cm. long, flowers whitish, the sterile ones later changing to purplish, styles 3; fruit a 3-beaked capsule about 4 mm. long. (*Paniculáta*, in a panicle.)

Native of Japan. The typical form is seldom seen in Minnesota. The following variety is perfectly hardy and is the one commonly grown here.

2a. H. paniculata var. **grandiflora** Sieb. Ill. Gartenz. 1866: 81. 1866.

Almost all the flowers sterile, the panicles very large and showy. Commonly known to gardeners as "Peegee." Blossoms in August and September. (*Grandiflóra*, large-flowered.)

3. RIBES L. Sp. Pl. 200. 1753.

CURRANT, GOOSEBERRY

Shrubs with alternate, often fascicled, usually lobed, petioled leaves; stems frequently spiny; flowers racemose or subsolitary, borne with the leaves or from separate lateral buds, perfect or rarely polygamo-dioecious, regular, epigynous; hypanthium saucer-shaped, campanulate, or tubular; sepals 5, petals 5 small, stamens 5, alternate with the petals, carpels 2, ovary inferior or half-inferior, 1-celled, with numerous ovules borne on 2 mostly parietal placentae; styles free or united, stigmas 2, rarely 1; fruit a berry. (*Ribes*, the Arabic name.)

A genus of about 120 species of the north temperate zone and the Andes. Most abundant in western North America and eastern Asia.

1. Flowers in racemes; pedicel jointed at the base of the flower; stems smooth except in *Ribes lacustre*. CURRANTS.
   (1) Stems very prickly; hypanthium saucer-shaped 1. *R. lacustre*
   (2) Stems smooth.
      a. Hypanthium campanulate to saucer-shaped or nearly obsolete.
         (a) Hypanthium saucer-shaped or nearly obsolete; leaves without yellow resinous glands on the lower surface.
            m. Racemes compact; bracts longer than the pedicels, with very glandular margins 2. *R. alpinum*
            n. Racemes lax; pedicels much exceeding the bracts.
               (m) Pedicels and ovaries covered with stalked glands 3. *R. prostratum*
               (n) Pedicels and ovaries without stalked glands.
                  r. Flowers purplish; low, creeping or ascending shrub 4. *R. triste*
                  s. Flowers greenish yellow; erect shrub 5. *R. vulgare*
         (b) Hypanthium campanulate or crateriform; leaves with yellow resinous dots on the lower surface.
            m. Hypanthium campanulate, 2.5–5 mm. high; flowers greenish yellow; flowering racemes drooping.
               (m) Bracts 5–8 mm. long, exceeding the pedicels 6. *R. americanum*
               (n) Bracts less than 3 mm. long, much shorter than the pedicels 7. *R. nigrum*
            n. Hypanthium crateriform, about 1 mm. high; flowers white; flowering racemes erect 8. *R. hudsonianum*
      b. Hypanthium long-tubular; flowers bright yellow, fragrant 9. *R. odoratum*
2. Peduncles 1–4-flowered, borne at the summit of short leafy shoots; pedicel not jointed at the base of the flower; stems more or less prickly. GOOSEBERRIES, Genus *Grossularia* of many authors.

(1) Ovary bristly, fruit prickly; styles united to the summit 10. *R. Cynosbati*
(2) Ovary glabrous, pubescent, or with stalked glands; styles free above the middle.
a. Stamens and styles long exserted (about 1 cm.); flowers greenish white 11. *R. missouriense*
b. Stamens and styles little or not at all exserted; flowers greenish or purplish.
(a) Stamens about equalling the petals 12. *R. oxyacanthoides*
(b) Stamens twice as long as the petals.
m. Hypanthium broadly campanulate, pubescent; ovary pubescent, often glandular 13. *R. Grossularia*
n. Hypanthium narrowly campanulate, glabrous or with a few scattered hairs; ovary glabrous, rarely sparingly pubescent or with stalked glands 14. *R. hirtellum*

RIBES ODORATUM RIBES LACUSTRE

1. Ribes lacustre (Pers.) Poir. in Lam. Encycl. Suppl. 2: 56. 1812.

SWAMP BLACK CURRANT

Low shrub 4–6 dm. high, stems and branches yellowish brown covered with bristly prickles and somewhat longer, slender spines at the nodes; leaves thin, nearly glabrous, but with scattered hairs on both surfaces and finely ciliate margin, pentagonal in outline, 2.5–7 cm. long and about as

broad, cordate at the base, mostly deeply 5-lobed, the lobes acutish, with rounded incised teeth; petioles about as long as the blades or slightly shorter, pubescent with spreading gland-tipped hairs; racemes drooping, 2–5 cm. long, rather few-flowered, the peduncle and pedicels puberulent and glandular-bristly, flowers greenish or purplish, about 7 mm. in diameter, hypanthium saucer-shaped, sepals blunt, about twice as long as the petals, stamens very short, styles about 1.5 mm. long, united for about one-third of their length, ovary densely covered with gland-tipped bristles, berry reddish black, 6–10 mm. in diameter, glandular bristly. (*Lacústre*, of the lake.)

In cool woods and swamps, in the northern part of the state, commonest north of Lake Superior. Newfoundland and Labrador to Alaska, south to Massachusetts, Pennsylvania, Minnesota, Colorado, and California. Blossoms late in June; fruit ripe in August.

2. **Ribes alpinum** L. Sp. Pl. 200. 1753.

MOUNTAIN CURRANT

A dense, spreading shrub 1–2 m. high, young twigs yellowish gray, the stem after the exfoliation of the epidermis becoming blackish gray; leaves rather firm, puberulent along the veins and with scattered hairs and sessile or stalked black glands especially on the upper surface and a sparsely ciliate margin, broadly ovate to rhombic in outline, 2–5 cm. long, 1.5–4.5 cm. wide, mostly 3-lobed, lobes triangular, irregularly toothed, teeth usually rather rounded, base generally rounded varying to cordate or narrowed; petioles about one-half the length of the blades, pubescent with scattered gland-tipped hairs; racemes from the base of leafy shoots, erect, compact, 1.5–4 cm. long, peduncles and pedicels glandular, bracts conspicuous, the lower ones exceeding the flowers, their margins glandular; flowers polygamo-dioecious, greenish yellow, about 5 mm. in diameter, hypanthium saucer-shaped in the staminate flowers, nearly obsolete in the pistillate flowers, sepals oblong, nearly four times as long as the broadly cuneate petals, stamens about as long as the petals, styles very short, nearly separate, ovary pyriform, glabrous. Fruit red, persistent, large. (*Alpínum*, alpine.)

Native of Europe. Cultivated as an ornamental shrub, chiefly valuable on account of the brilliant fruit. Blossoms in April or early May.

3. **Ribes prostratum** L'Her. Stirp. Nov. 3: pl. 2. 1785.

SKUNK CURRANT

Low shrub with decumbent or spreading unarmed branches, young twigs yellowish brown, becoming gray the second year, blackish with age; foliage ill-smelling, leaves thin, essentially glabrous, sometimes with scattered hairs on one or both surfaces, and with sparsely ciliate margin, orbicular or reniform in outline, 3.5–6 cm. long, 5–8 cm. wide, deeply cordate at the base, deeply 5-lobed, lobes acute, somewhat rhombic, slightly narrowed towards the base, irregularly and coarsely doubly serrate, the teeth generally rounded and callus-tipped; petioles about as long as the blades, the dilated bases usually glandular ciliate; racemes ascending, 3–6

RIBES

cm. long, loosely several-flowered, peduncles and pedicels puberulent and with numerous stalked glands, bracts shorter than the pedicels, glandular; flowers yellowish green or somewhat purplish, short-campanulate, about 4 mm. in diameter; hypanthium deeply saucer-shaped, less than 1 mm. high, sepals oblong, about twice as long as petals, glabrous, stamens about as long as the petals, anther sacs in contact with each other, styles erect, free nearly to the base, ovary densely glandular-bristly, berry dark red, glandular-bristly, 6–7 mm. in diameter, unpleasantly flavored. (*Prostrátum*, prostrate, referring to the decumbent habit.)

Common in swamps throughout the coniferous forest, most abundant northeastward. Newfoundland and Labrador to Mackenzie and northeastern British Columbia, south to northeastern Minnesota, and in the mountains of North Carolina. Blossoms in May and June; fruit ripe in July.

4. **Ribes triste** Pall. Nova Acta Petrop. 10: 378. 1797.

SWAMP RED CURRANT

Low, unarmed, straggling or reclining shrub, the branches often rooting freely, young twigs yellowish brown, second-year twigs with exfoliating epidermis, becoming blackish gray; leaves thin, nearly or quite glabrous above, pale and pubescent beneath, with sparsely ciliate margin, pentagonal in outline with nearly parallel sides, 5–10 cm. long, and about as broad, cordate or truncate at the base, usually conspicuously decurrent on the petiole, mostly 3-lobed, lobes broadly triangular, doubly crenate-serrate, teeth conspicuously callus-tipped; petioles mostly shorter than the blades, more or less pubescent and minutely glandular; racemes drooping, usually naked, 3–4 cm. long, several-flowered, peduncles and pedicels puberulent and glandular, bracts very small; flowers purplish, 4–5 mm. in diameter, flat, hypanthium nearly obsolete, sepals broadly wedge-shaped, very obtuse, petals about one-third the length of the sepals, wedge-shaped, stamens about the length of the petals, anther sacs in contact with each other, styles very short, free almost to the base, ovary glabrous, berry bright red, glabrous, 4–7 mm. in diameter, acid. (*Tríste*, sad, probably referring to the dark color of the flowers.)

In cool woods and swamps, from Hennepin County northward. Newfoundland to Alaska, south to New Jersey, Michigan, South Dakota, and Oregon, also in northern Asia. Blossoms in May while the leaves are unfolding, fruit ripe in late June and July.

5. **Ribes vulgare** Lam. Encycl. 3: 47. 1789.

RED CURRANT

Erect, unarmed shrub 1–2 m. high, young twigs greenish yellow, second-year twigs gray, becoming dark brown with age, without much exfoliation of the outer epidermis; leaves rather firm, nearly glabrous above, or with a few scattered hairs, strigose pu-

bescent beneath, especially along the veins, ciliate on the margin, suborbicular to pentagonal in outline, the sides diverging upward, 4–7 cm. long, 4.5–9 cm. wide, cordate to subcordate at the base, scarcely decurrent on the petiole, 3–5-lobed, lobes ovate-triangular, irregularly crenate-dentate, teeth at maturity very blunt, glandular-mucronate; petioles about the length of the blades, puberulent, slightly glandular, their dilated bases strongly glandular-ciliate; racemes drooping, 3–10 cm. long, several- to many-flowered, peduncles puberulent and slightly glandular, pedicels essentially glabrous, bracts much shorter than the pedicels, truncate at the apex; flowers greenish, flat, about 5 mm. in diameter, hypanthium obsolete, disc 5-lobed, sepals broadly wedged-shaped, petals truncate at the apex, about one-third as long as the sepals, stamens slightly longer than the petals, inflexed, anther sacs widely separated by the broad connective, styles united at the base, divergent at the top, ovary glabrous, berry bright red or whitish, 8–12 mm. in diameter, pleasantly acid. (*Vulgáre*, common)

Cultivated throughout the state, occasionally escaping, generally to swamps. Probably native of western Europe. Blossoms in May, berries ripe in late June and July.

RIBES ALPINUM

RIBES AMERICANUM

6. Ribes americanum Mill. Gard. Dict. ed. 8. no. 4. 1768.

WILD BLACK CURRANT

R. floridum L'Her. 1785.

Erect, unarmed shrub 1–1.5 m. high, young twigs pale yellowish green, becoming brownish gray and later dark brown, more or less angled; leaves thin, glabrous above, pubescent beneath, especially along the veins, ciliate along the margin, dotted on the back with yellow resinous glands, broadly ovate, orbicular or reniform in outline, 4–7 cm. long, 4–9 cm. wide, cordate or truncate at the base, rather deeply 3–5-lobed, lobes triangular, ovate or somewhat rhombic, rather acute, coarsely doubly serrate, teeth moderately acute; petioles slightly shorter than the blades, puberulent, often glandular-dotted, dilated and fimbriate towards the base, the fimbriae puberulent; racemes axillary or terminal on short leafy shoots, drooping, 4–8 cm. long, several-flowered, peduncles and pedicels downy, bracts longer than the pedicels, linear lanceolate, persistent, flowers greenish white, 8–10 mm. in diameter; hypanthium campanulate, pubescent on the outside, 3–5 mm.

long, sepals obovate, rounded at the apex, spreading, nearly as long as the hypanthium, slightly pubescent on the outside, petals oblong, erect, three-fourths as long as the sepals, stamens shorter than the petals, styles united almost to the summit, 6–7 mm. long, ovary elongated, only half-inferior, puberulent or nearly glabrous; berry black, smooth, 6–10 mm. in diameter, edible. (*Americánum*, American.)

Common in woods and thickets throughout the state. Nova Scotia west to Alberta, south to Virginia, Nebraska, and Wyoming, also in New Mexico. Blossoms in May or early June, fruit ripe in July.

7. **Ribes nigrum** L. Sp. Pl. 201. 1753.

BLACK CURRANT

Upright shrub 1–2 m. high, unarmed, young twigs greenish gray, second year twigs yellowish gray becoming blackish with age, foliage ill-smelling, leaves thin, somewhat rugose, at first puberulent, becoming nearly glabrate with age, with a few resinous glands especially on the lower surface, ciliate along the margin, orbicular to reniform in outline, 2–6 cm. long, 3–8 cm. wide, mostly deeply cordate at the base, 3–5-lobed, lobes triangular or broadly ovate, coarsely doubly serrate, the teeth sharp or more or less rounded, gland-tipped; petioles mostly longer than the blades, puberulent and sparsely gland-dotted, fimbriate towards the expanded base, fimbriae puberulent; racemes from the base of leafy shoots, somewhat drooping, 4–6 cm. long, rather few-flowered, peduncles and pedicels puberulent, bracts much shorter than the pedicels; flowers greenish white, campanulate 7–12 mm. in diameter, hypanthium broadly campanulate, about 3 mm. high, puberulent and gland-dotted, sepals oblong, reflexed, about 5 mm. long, puberulent, petals about half as long as the sepals, broadly ovate, denticulate at the apex, stamens about as long as the petals, styles united nearly to the summit, stigma 2-lobed, ovary only half-inferior, the lower part turbinate, glandular-dotted; berry black, dotted with resinous glands, 6–10 mm. in diameter. (*Nigrum*, black, referring to the black fruit.)

Sparingly cultivated and escaping into swamps. Native of Europe and western Asia. Blossoms in late May, fruit ripe in late July.

8. **Ribes hudsonianum** Richards. Bot. App. Frankl. Journ. ed. 2. 6. 1823.

A more or less erect, unarmed shrub 5–10 dm. high, young twigs yellowish brown, densely puberulent, one-year-old twigs light gray, exfoliating with age and becoming reddish black, foliage ill-scented; leaves rather firm and rugose, nearly glabrate above, densely pubescent and gland-dotted beneath, ciliate on the margin, suborbicular to reniform in outline, 4–7 cm. long, 5–9 cm. wide, deeply cordate at the base, 3–5-lobed, the lobes broadly triangular to somewhat rhombic, coarsely and doubly crenate-serrate, teeth (in mature leaves) rounded and callus-tipped; petioles about three-fourths the length of the blades, densely puberulent, and dotted with resinous glands, the dilated base fimbriate; racemes erect, borne from the base of leafy shoots, 2–4 cm. long, several-flowered, peduncles and pedicels

puberulent, bracts narrowly lanceolate, much shorter than the pedicels; flowers white, turbinate, about 5 mm. in diameter, hypanthium crateriform, about 1 mm. high, sepals oblong-lanceolate slightly spreading, about 3 mm. long, sepals and hypanthium densely pubescent, petals about one-half as long as the sepals, narrowly cuneate, truncate at the apex, stamens about as long as the petals, styles conical, united for about three-fourths of their length, stigmas slightly divergent, ovary about three-fourths inferior, the lower part obconical and gland-dotted; berry black, glabrous, 5–10 mm. in diameter. (*Hudsoniánum*, referring to Hudson Bay.)

Locally common in cool swamps as far south as the headwaters of the Mississippi River and the north shore of Lake Superior. Hudson Bay to central Alaska, south to Ontario, Minnesota, and eastern British Columbia. Blossoms in May and early June, fruit ripe in July and August. (See cut, p. 141.)

9. Ribes odoratum Wendl. in Bartl. & Wendl. Beitr. 2: 15. 1825.

GOLDEN CURRANT, FLOWERING CURRANT

R. aureum of many authors, and of Minn. T. and S. 1912, not *R. aureum* Pursh.

Upright or straggling, unarmed shrub 1–2 mm. high, twigs yellow-brown, one-year-old twigs brownish gray, becoming blackish gray and rough with age; leaves firm in texture, at first pubescent with scattered hairs on both surfaces, and with abundant resinous glandular dots, soon glabrate, ciliate on the margin, broadly wedge-shaped to orbicular in outline, 2.5–5 cm. long, 2.5–6 cm. wide, cuneate or truncate at the base, deeply 3–5-lobed, lobes oblong or somewhat rhombic, tending to be 3-lobulate, nearly entire, or with a few coarse crenate-dentate teeth; petioles very slender, mostly longer than the blades, pubescent; racemes spreading, borne on the ends of leafy twigs, about 3 cm. long, rather few-flowered, peduncles strongly pubescent, pedicels puberulent, bracts foliaceous, persistent, the upper ones elliptical; flowers golden yellow, salver-form, very fragrant with the odor of cloves, about 1.5 cm. in diameter and 1.5 cm. long, hypanthium long-tubular 10–13 mm. long, 2.5 mm. in diameter, sepals spreading, obovate, rounded at the apex, petals erect, oblong, usually tinged with crimson, about 3 mm. long, stamens slightly shorter than the petals, fused with them at the base, styles united to the apex, stigma 1, obscurely 2-lobed, slightly exserted, ovary glabrous; fruit black, about 8 mm. in diameter. (*Odorátum*, scented.)

Much planted as an ornamental shrub, and occasionally escaping in the southern half of the state, probably not native in any part of the state. Native of the Great Plains from South Dakota to Texas. The far western *R. aureum* Pursh is a distinct species. Blossoms in May, fruit ripe in July. (See cut, p. 139.)

10. Ribes Cynosbati L. Sp. Pl. 202. 1753.

PRICKLY GOOSEBERRY

Grossularia Cynosbati (L) Mill.

An erect or spreading, spiny shrub 0.5–1.5 m. high, twigs and branches more or less prickly and with 1–3 spines at each node, young twigs pubescent and generally brownish, one-year-old twigs greenish gray, becoming dark

gray with age; leaves rather thin, finely pubescent above, densely and velvety pubescent beneath with some of the hairs gland-tipped, nearly orbicular in outline, 3–5 cm. long, 3.5–5.5 cm. wide, cordate to truncate at the base, 3–5-lobed, the lobes oblong to rhombic, irregularly crenate-dentate, the teeth rounded and callus-tipped; petioles slender, mostly shorter than the blades, pubescent with both simple and gland-tipped hairs; peduncles 1–3-flowered, pubescent like the petioles, pedicels 5–12 mm. long, pubescent, bracts small, ovate; flowers greenish white, campanulate to urceolate, 5–7 mm. in diameter, hypanthium greenish, broad-cylindrical 3–5 mm. long, glabrous on the outside, or with a few spreading hairs, pubescent within, sepals oblong to obovate, about 3 mm. long, spreading to reflexed at anthesis, petals obovate one-fourth to one-third as long as the sepals, somewhat spreading at anthesis, stamens three-fourths as long as the sepals, inserted below the summit of the hypanthium, styles united nearly to the summit but easily separable in the distal portion, hairy towards the base, stigmas 2, ovary half-elliptical, pubescent or glabrous, more or less prickly, the prickles at first gland-tipped; berry prickly, 8–15 mm. in diameter, reddish purple when mature. (*Cynósbati*, Gr. dog brier.)

Common in woods and thickets throughout the southern half of the state, less frequent as far north as Itasca Park and Carlton County. New Brunswick west to Manitoba, south to North Carolina, Alabama, and Missouri. Blossoms in May (early June towards the northern part of its range), fruit ripe in July.

11. **Ribes missouriense** Nutt. ex Torr. & Gray, 1: 548. 1840.

MISSOURI GOOSEBERRY

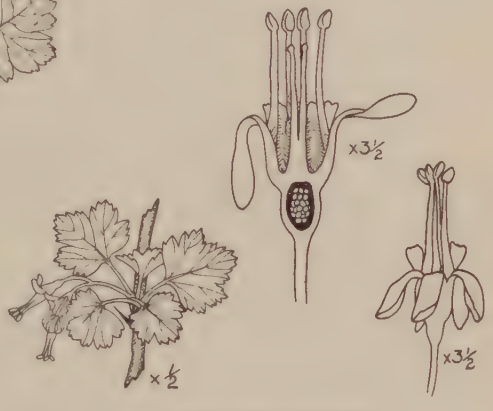
R. gracile of various authors, not of Michaux.
Grossularia missouriensis (Nutt.) Coville & Britton.

A more or less upright shrub 1–2 m. high, armed with 1–3 stout nodal spines and sometimes weakly prickly, young twigs slender, greenish yellow, one-year-old twigs gray, soon exfoliating and becoming blackish; leaves mostly on short shoots, rather firm and rugose, sparingly pubescent or glabrate above, strongly pubescent with rather stiff hairs beneath, nearly orbicular in outline, 2–4 cm. long, 2–4 cm. wide, cuneate or truncate at the base, mostly 3-lobed, lobes oblong or rhombic, coarsely and irregularly incised crenate-dentate, the teeth obscurely callus-tipped; petioles generally shorter than the blades, pubescent and more or less fimbriate towards the base; peduncles mostly longer than the petioles, 2–3-flowered, slightly puberulent and with a few glandular hairs, pedicels slender, 5–8 mm. long, pubescent or glabrate, bracts broadly ovate, about 2 mm. long, glandular-ciliate; flowers greenish white, hypanthium cylindrical, 2–2.5 mm. long and about 1.5 mm. in diameter, glabrous or pubescent, sepals linear-oblong,

about 7 mm. long, reflexed at anthesis; petals spatulate, 2–3 mm. long, slightly erose, erect, stamens long-exserted, about 10 mm. long, styles 12 mm. long, united halfway to the summit, stigmas small, capitate; ovary subcylindrical, glabrous; berry globose, 8–15 mm. in diameter, nearly black when ripe. (*Missouriénse*, Missouri, the original collection being from that state.)

In woods, thickets, and rocky hillsides throughout the hardwood and prairie regions of the state, as far northwestward as the Red River Valley. Wisconsin to North Dakota, south to Illinois, Tennessee, and Kansas. Blossoms in May, fruit ripe in late July and August.

RIBES CYNASBATI



RIBES MISSOURIENSE

12. Ribes oxyacanthoides L. Sp. Pl. 201. 1753.

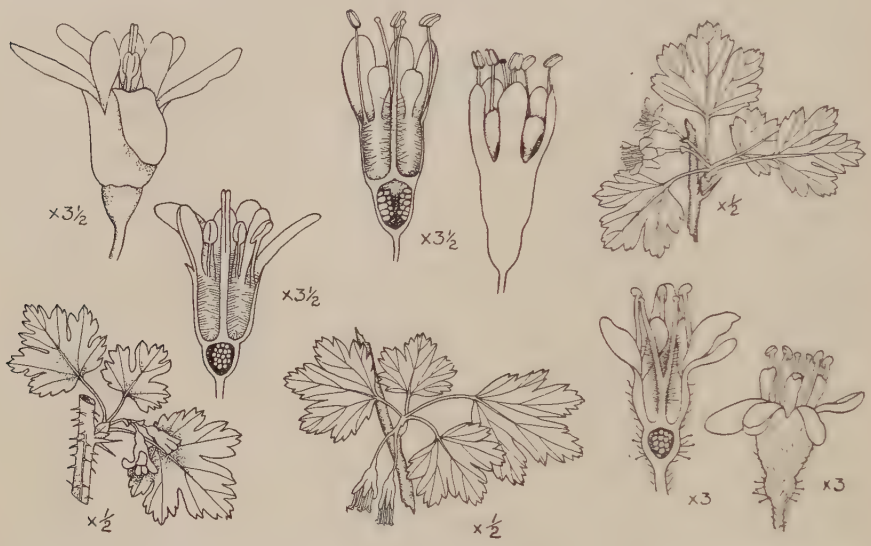
NORTHERN GOOSEBERRY

Grossularia oxyacanthoides (L.) Mill.

A low, more or less prickly shrub, with 1–3 light colored nodal spines; young twigs puberulent, greenish yellow, one-year-old twigs yellowish gray, in age becoming dark reddish brown; leaves rather thin, usually rugose when mature, sparsely rough-pubescent, usually with some glandular hairs on the lower surface, obscurely ciliate on the margin; suborbicular in outline, 2–4 cm. long and about as wide, slightly cordate, truncate or broadly cuneate at the base, incisely 3–5-lobed, lobes rhombic, rather irregularly crenate-dentate; petioles usually shorter than the blades, puberulent and with scattered glandular hairs, somewhat fimbriate, the fimbriae often gland-tipped and sparsely pubescent; peduncles very short, scarcely exserted from the bud scales, pubescent, mostly 1–2-flowered, pedicels 2–3 mm. long; bracts broadly ovate, clasping, glandular hairy; flowers greenish,

about 7–8 mm. long, hypanthium broadly cylindrical, about 3 mm. long and about 2.5 mm. in diameter, glabrous, sepals oblong, 3–4 mm. long, reflexed at anthesis, petals spatulate, about 3 mm. long, stamens about as long or slightly shorter than the petals, styles exserted, approximate, united for a little more than half of their length, hairy, ovary ellipsoid, typically glabrous, about three-fourths inferior; berry globose, about 1 cm. in diameter. (*Oxyacanthoides*, with sharp spines.)

In swamps and low ground, confined to the region of the coniferous forest. Hudson Bay to Yukon and British Columbia, south to northern Michigan, Minnesota, North Dakota, and Montana. Blossoms in May and early June, fruit ripe in August.



RIBES OXYACANTHOIDES RIBES HIRTELLUM RIBES GROSSULARIA

13. Ribes Grossularia L. Sp. Pl. 201. 1753.

GARDEN GOOSEBERRY

Grossularia reclinata (L.) Mill.

A shrub 6–10 dm. high with ascending or reclining stems, nodal spines 1–3, rather stout, sometimes with a few scattered prickles, young twigs yellowish gray, puberulent, one-year-old twigs gray, glabrate, becoming somewhat darker with age; leaves rather firm in texture, more or less pubescent on both sides, suborbicular in outline, 2–4 cm. long, 2–4 cm. wide, mostly cordate or truncate at the base, rarely somewhat cuneate, deeply 3–5-lobed, lobes rhombic, to somewhat wedge-shaped, deeply and irregularly crenate-dentate, teeth obtuse, not mucronate-tipped; petioles mostly as long or longer than the blades, pubescent, sometimes with a few gland-tipped hairs; peduncles 1–2-flowered, less than 1 cm. long, pubescent, pedicels shorter than the peduncles, strongly pubescent and glandular, bracts very short, pubescent; flowers greenish to purplish,

8–10 mm. in diameter; hypanthium broadly campanulate, about 3 mm. long and 4–5 mm. in diameter, pubescent, sepals greenish, oblong to obovate, about 5 mm. long, usually pubescent, reflexed at anthesis, petals whitish, obovate or cuneate with rounded apex, one-third to one-half the length of the sepals, stamens twice as long as the petals, styles united for about one-third of their length, approximate, hairy below, ovary wholly inferior, pubescent, and with stalked glands; berry mostly globose, 1–2 cm. in diameter, pale green to dark purple when ripe, more or less pubescent, and with stalked glands. (*Grossulária*, like a small unripe fig.)

Cultivated throughout the state, native of Europe. Blossoms in late April or early May, fruit ripe in June.

13a. R. Grossularia var. Uva-crispa (L.) Sm. Engl. Fl. 2: 333. 1824.

R. Uva-crispa L.

Differs from the species in having the ovary and fruit pubescent but not glandular, fruit small and yellowish. (*Úva-crispa*, curly grape or berry.)

Native of Europe, somewhat more northern in range than the type.

14. Ribes hirtellum Michx. Fl. Bor. Am. 1: 111. 1803.

Grossularia hirtella (Michx.) Spach.

Low, armed or unarmed shrub 6–12 dm. high, prickles weak, bristle-like or more frequently wanting, nodal spines 1–3 at a node, slender, short, frequently wholly wanting, young twigs yellowish brown, nearly or quite glabrous, one-year-old twigs pale gray, becoming dark reddish brown with age; leaves thin, essentially glabrous above, sparsely pubescent beneath, strongly ciliate on the margin, obovate-orbicular to reniform-orbicular in outline, 2–3.5 cm. long, 2–4 cm. wide, cuneate, truncate or slightly cordate at the base, incisely mostly 5-lobed, lobes oblong to rhombic, irregularly crenate-dentate, teeth acute to very blunt, minutely callus-apiculate; petioles puberulent, slightly fimbriate, mostly shorter than the blades; peduncles 1–3-flowered, about 5 mm. long, glabrous, pedicels about as long as the peduncles, bracts obovate; flowers greenish, about 7 mm. long, hypanthium narrowly campanulate, about 3.5 mm. long, 2–2.5 mm. in diameter, glabrous outside, pubescent within, sepals oblong, about the length of the hypanthium, slightly spreading at anthesis, petals obovate, about half as long as the sepals, stamens as long as the sepals or slightly longer, exserted, styles united for about one-third of their length, hairy, divergent, ovary nearly globular, wholly inferior, glabrous, or with stalked glands; berry globose, purple or black when ripe, 8–10 mm. in diameter. (*Hirtéllum*, slightly hirsute.)

In swamps and moist woods most abundant throughout the coniferous region, less frequent in the eastern part of the state as far south as the Twin Cities. Newfoundland to Manitoba, south to West Virginia, Minnesota, and South Dakota. The source of some of our cultivated gooseberries both directly by selection and by hybridization with the preceding species. Blossoms in late May and June, fruit ripe in late July.

HAMAMELIDACEAE WITCH-HAZEL FAMILY

Shrubs or trees with alternate simple leaves and deciduous stipules; flowers in heads or spikes, often polygamous or monoecious; calyx adhering to the base of the pistil, 4–5-parted or lobed; petals 4–many or none, long and narrow; stamens 4–many, distinct; pistil compound; carpels 2, united at base; fruit a 2-beaked, 2-celled, woody capsule, opening at the summit, with 1–several bony seeds in each cell.

A family of about 13 genera and 50 species, natives of North America, Asia, and South Africa.

Only the following genus occurs in Minnesota.

HAMAMELIS L. Sp. Pl. 124. 1753.

WITCH-HAZEL

Tall shrubs or small trees, with alternate, toothed, straight-veined leaves; flowers in small axillary clusters, bright yellow, surrounded by a scale-like 3-leaved involucre, appearing in late summer or autumn; calyx 4-parted, persistent, adnate to the base of the ovary; petals 4, narrow, strap-shaped; stamens 8, short, the 4 opposite the petals imperfect and scale-like; pistil 2-celled; styles 2, short; fruit a woody capsule, opening by two valves at the top. (*Hamamélis*, Greek name for some tree.)

A genus of 3 species, one native of eastern North America, the others of Japan.

Hamamelis virginiana L. Sp. Pl. 124. 1753.

WITCH-HAZEL

A branching shrub 2–4 meters high; twigs with slightly scurfy or smooth bark; leaves short-petioled, obovate or oval, 6–15 cm. long, 4–10 cm.wide; wavy-toothed and stellate pubescent at least when young; flowers appearing in autumn when the leaves are falling and while the previous fruit remains; seeds mature the summer after the flowering. (*Virginiána*, Virginian.)

In damp woods in the southeastern corner of the state as far north as Gwinn's Bluff, Winona County. Distributed from Nova Scotia to eastern Minnesota, south to Florida and Texas. Blossoms in September and October, fruit ripe the following summer.

The bark is astringent and is used in the form of fluid extracts and decoctions, but is not known to have any essential properties.

PLATANACEAE PLANE TREE FAMILY

Trees with deciduous bark and alternate, simple, palmately lobed leaves; petioles hollow at the base and concealing the axillary bud; flowers in spherical monoecious heads, the flowers in a head so crowded together that the

limits of the individual flowers are difficult to determine; anthers of staminate head nearly sessile, consisting of two pollen sacs and an enlarged peltate connective; pistillate heads consisting of simple pistils, intermixed with staminodes; in both heads there occur very minute scales, which have been variously interpreted*; fruit a dense globular head of club-shaped nutlets each with a tuft of hairs at the base.

HAMAMELIS VIRGINIANA

The family contains only the following genus. Its relationship to other families is somewhat doubtful.

* The best interpretation seems to be that the staminate flower consists of a group of 3–4 stamens surrounded by minute scales, which constitute a perianth, and the pistillate flower of 6–8 free carpels surrounded by a ring of staminodes and that again by a perianth; some authors distinguish "sepals" and "petals" among the scales; others regard each carpel as constituting a "flower," and consider the scales as bracts.

PLATANUS L. Sp. Pl. 999. 1753.

SYCAMORE, PLANE TREE

Characters of the family. Eight species, mostly natives of the southwestern United States and Mexico, the following in the eastern United States, and one in southwestern Asia. (*Platánus*, the classical name of the Asiatic plane tree.)

Platanus occidentalis L. Sp. Pl. 999. 1753.

SYCAMORE, BUTTONWOOD

A large tree, reaching in the Ohio Valley a height of 40 m.; bark deciduous, greenish white when newly exposed, gradually becoming yellowish brown, the trunk in consequence commonly mottled; leaves alternate, rhombic-reniform in outline, 10–20 cm. long, 15–30 cm. wide, strongly 3-nerved, deeply lobed, the lobes triangular to ovate, acuminate, base truncate or cordate, margin entire except for a few coarse teeth or secondary lobes, surface very woolly when young, soon becoming glabrous above, and nearly glabrous except along the veins beneath; heads of fruit about 3.5 cm. in diameter, borne on drooping peduncles nearly 1 dm. long. (*Occidentális*, western, i.e., belonging to the New World.)

Native of eastern North America from southern Maine to southern Ontario and central Iowa, south to Florida, Mississippi, and Texas. Early reports of this tree from southeastern Minnesota seem to be in error, at least there is no evidence at present of its occurrence there. It is occasionally planted and is entirely hardy at least as far north as Minneapolis.

ROSACEAE ROSE FAMILY

Herbs, shrubs, or trees, unarmed, or prickly, spiny, or thorny; leaves alternate, simple or compound, usually stipulate, the stipules often early deciduous; flowers perfect or polygamo-dioecious, regular; the receptacle or hypanthium varying from slightly concave to cup-shaped or deeply urn-shaped, lined with a glandular disk; sepals 4–5 (an epicalyx of 5 bracts, alternating with the sepals, sometimes present); petals 4–5 rarely lacking; stamens generally numerous in whorls or cycles of 5 or 10, inserted along the edge of the disk; carpels 1–many, free or united below into a 2–10-celled compound ovary; styles as many as carpels, terminal or lateral; ovules 1–2 or several; fruit various—achenes, follicles, pome, hip, drupe, or an aggregation of drupelets.

A large family of cosmopolitan distribution but mainly of the north temperate regions. Wide differences of opinion exist in regard to the taxonomic unity of the family. Accordingly it is either divided into subfamilies or split up into a number of separate families. The same difference also exists in regard to the conceptions of genera and species as a result of which their number varies between very wide limits. In a broader sense the family embraces about 90 genera and 2,000 species.

1. Leaves compound.
   a. Carpels numerous (more than 5), free; fruit achenes, druplets, or nutlets.
      (1) Flowers yellow, fruit ripening into dry, hairy achenes; unarmed shrub 1. *Potentilla*
      (2) Flowers white or pink, fruit drupelets, or nutlets enclosed in a fleshy hip; spiny or prickly shrubs.
         (a) Pistils on a raised or conical receptacle, fruit an aggregate of drupelets 2. *Rubus*
         (b) Pistils in a fleshy urn-shaped receptacle, which encloses the nutlets 7. *Rosa*
   b. Carpels few (5 or less); free or united with one another and with the receptacle; fruit follicles or a pome.
      (1) Flowers in flat corymbs; fruit a pome 10. *Sorbus*
      (2) Flowers in ample panicles; fruit follicles 6. *Sorbaria*
2. Leaves simple.
   a. Leaves opposite; sepals foliaceous, about 1 cm. broad 3. *Rhodotypos*
   b. Leaves alternate; sepals smaller, not foliaceous.
      (1) Carpels more than one (3–5 or many).
         (a) Pistils on a conical receptacle; fruit an aggregation of drupelets 2. *Rubus*
         (b) Carpels in a concave or hollow receptacle, free or united with it and with one another.
            m. Flowers perigynous; fruit dry, 2–5 follicles.
               o. Follicles inflated, splitting on both sides, seeds shiny 4. *Physocarpus*
               p. Follicles not inflated, splitting on one side, seeds dull 5. *Spiraea*
            n. Flowers epigynous; fruit a fleshy pome.
               o. Carpels cartilaginous or leathery when mature, imbedded in the receptacle.
                  r. Cavities of the compound ovary as many as styles.
                     v. Ovules and seeds 1–2 in each cavity.
                        x. Trees; flowers in cymes 11. *Malus*
                        y. Low shrubs; flowers in compound cymes 9. *Aronia*
                     w. Ovules and seeds numerous in each cavity 8. *Chaenomelis*
                  s. Cavities of the ovary becoming twice as many as the styles 14. *Amelanchier*
               p. Carpels hard and bony when ripe, distinct or cohering in fruit.
                  (r) Fertile ovule 1 in each carpel; leaves mostly lobed and doubly serrate; thorny trees or shrubs 12. *Crataegus*
                  (s) Fertile ovules 2 in each carpel, stones 2-seeded, thornless shrubs 13. *Cotoneaster*
      (2) Carpel one, fruit a drupe 15. *Prunus*

1. POTENTILLA L. Sp. Pl. 495. 1753.

CINQUEFOIL, FIVEFINGER

Herbs, or rarely shrubs; leaves alternate, compound and stipulate; flowers mostly yellow, cymose or solitary; hypanthium flat or hemispheric; sepals 5, persistent, with 5 bracts alternating with them; petals 5, obovate

or orbicular; stamens mostly numerous; carpels many, on a dry, usually hairy receptacle; fruit a collection of achenes. (*Potentilla*, from L. *potens*, powerful, with a diminutive suffix, referring to the medical properties.)

A genus of about 150 species, nearly all of them natives of the north temperate zone. Some 24 species occur in eastern North America and about 30 others in the western and northwestern parts of the continent. The great majority of the species are herbaceous; the following one is strictly shrubby.

POTENTILLA FRUTICOSA

1. Potentilla fruticosa L. Sp. Pl. 495. 1753.

SHRUBBY CINQUEFOIL

Dasiphora fruticosa Rydb. 1898.

Stem more or less erect, shrubby, 2–10 dm. high, much branched; bark reddish brown, becoming much shredded; leaves pinnate, 1–3 cm. long; petiole pubescent, about 1 cm. long; stipules conspicuous, lanceolate, papery, about as long as the petiole; leaflets mostly 5, crowded, 10–17 mm. long, 2–4 mm. wide, oblong-lanceolate, sparsely hairy above, silky pubescent below, entire with revolute margins; flowers in few-flowered cymes at the

ends of the branches, about 2 cm. in diameter, petals bright yellow, orbicular; carpels densely pubescent; achenes long, hairy. (*Fruticósa*, shrubby.)

Frequent in rocky situations and open meadows along the north shore of Lake Superior and in scattered localities southward and westward. Labrador to Alaska, south to New Jersey, Pennsylvania, the southern end of Lake Michigan, northern Iowa, Arizona, and California; also in Europe and Asia. Flowers and fruits from June to September.

A somewhat polymorphic, circumboreal species. Several geographic varieties and horticultural forms are in cultivation, varying in the form and pubescence of the leaflets, and in the size and color (deep yellow to pure white) of the flowers. Much of our native material belongs to the following variety.

1a. P. fruticosa var. **tenuifolia** (Willd.) Lehm. Monog. 31. 1820.

Plant somewhat more dwarf; leaves more densely silky pubescent, leaflets linear-lanceolate, about 2 mm. wide. (*Tenuifólia*, narrow-leaved.)

Distribution in Minnesota similar to that of the species, but apparently more common southward. It occurs in a marl bog about 15 miles south of Minneapolis. North America and eastern Asia.

2. RUBUS L. Sp. Pl. 492. 1753.

BRAMBLE, BLACKBERRY, RASPBERRY

Erect or procumbent shrubs or trailing vines, frequently prickly, with alternate, simple, lobed, or 3–7-foliolate leaves; flowers white (sometimes pink or purple); hypanthium saucer-shaped; sepals 5, persistent; petals 5, deciduous; stamens numerous; carpels usually many, borne on a spongy or succulent receptacle, ripening into drupelets and forming an aggregate fruit, edible. (*Rúbus*, bramble, akin to *ruber*, red.)

Most of the shrubby species have biennial canes and the leaves produced on the first year's canes, or turions, are often quite different from those borne on the lateral flowering shoots of the second year's growth. Both types of shoots should be studied by anyone attempting to identify the species.

A genus of over 200 species of wide geographical distribution but most abundant in the north temperate zone. The number of good species is very doubtful as many of the species are very variable, and particularly among the blackberries hybridization occurs with great freedom. Many minor variants and hybrids have been described from time to time as species.

1. All the leaves simple, palmately lobed — 1. *R. parviflorus*
2. Some or all of the leaves compound.
   a. Low unarmed plants, woody only at the base.
      (1) Stems erect, 3–12 cm. high, without runners, petals pink — 2. *R. arcticus* var. *grandiflorus*
      (2) Flowering stems ascending, 1–4 dm. high, runners long and trailing; petals white — 3. *R. pubescens*

b. Plants with woody biennial canes, more or less armed with prickles or bristles.
(1) Ripe fruit falling off whole from the dry receptacle; leaves white tomentose beneath. RASPBERRIES.
(a) Stems ascending, beset with straight, stiff bristles; fruit red.
x. Calyx and pedicels without glandular bristles, finely pubescent.
(x) Cultivated plant, the flowers with a conspicuous disk
4. *R. idaeus*
(y) Native plant, the disk of the flower concealed by the stamens
5a. rare forms of *R. strigosus* var. *canadensis*
y. Calyx and pedicels hispid with stalked glands.
(x) Stems, peduncles, and pedicels without fine pubescence
5. *R. strigosus*
(y) Stems, peduncles, and pedicels finely pubescent
5a. *R. strigosus* var. *canadensis*
(b) Stems recurving and rooting at the tip, armed with hooked prickles; fruit black or dark red.
(x) Pedicels and calyx without stalked glands, fruit becoming black
6. *R. occidentalis*
(y) Pedicels and calyx with stalked glands, fruit dark red
7. ×*R. neglectus*
(2) Ripe fruit not separating from the fleshy receptacle, leaves green beneath, more or less pubescent but not tomentose. BLACKBERRIES.
(a) Canes erect or somewhat arching, 1–2 m. high.
x. Peduncles and pedicels with numerous stalked glands.
(x) Terminal leaflet of turion leaves ovate, not conspicuously cordate
8. *R. nigrobaccus*
(y) Terminal leaflet of turion leaves broadly cordate-ovate
8a. *R. nigrobaccus* var. *sativus*
y. Peduncles and pedicels without stalked glands.
(x) Leaflets of turion leaves long acuminate; inflorescence leafy-bracted only at the very base 9. *R. argutus*
(y) Leaflets of turion leaves short acuminate; inflorescence conspicuously bracted throughout 10. *R. frondosus*
(b) Canes trailing or procumbent.
(x) Stems and petioles of the turion leaves armed with stiff, recurved prickles 1–3 mm. long, inflorescence few-flowered.
m. Leaves somewhat sharply serrate, slightly hairy beneath, especially along the veins; pedicels usually 2–5; stalked glands absent 11. *R. flagillaris*
n. Leaves with coarse, broadly rounded, mucronate teeth, pubescent beneath, pedicels 1–3, stems and pedicels sometimes with stalked or sessile glands 12. *R. Baileyanus*
(y) Stems and petioles with numerous bristle-like prickles, inflorescence many-flowered (5–12), the pedicels, calyx, petioles, and stems usually with abundant gland-tipped bristles
13. *R. setosus*

1. Rubus parviflorus Nutt. Gen. 1: 308. 1818.

SALMON-BERRY, THIMBLE-BERRY

An upright shrub 1–2 m. high, young shoots glandular-hispid but not prickly, older twigs with gray, shreddy bark; leaves simple, reniform to nearly orbicular in outline, 7–20 cm. long and about as broad, 3–5-lobed,

RUBUS PARVIFLORUS

mostly palmately 5-nerved, lobes broadly triangular, acute, dentate, the teeth mucronate, upper surface sparsely pubescent to glabrate, lower surface pubescent at least along the veins, petioles glandular-hispid, about half as long as the blades; stipules lanceolate, slightly adnate, glandular; inflorescence cymose, 3–12-flowered; flowers 3–5 cm. in diameter; sepals broadly ovate, abruptly long caudate-acuminate, 1.5–2.5 cm. long, densely glandular on the back, puberulent towards the margins, densely white tomentose within; petals white, broadly oval, 15–30 mm. long; fruit convex, light red, 15–20 mm. wide, drupelets cohering, separating from the receptacle, furnished with a hairy crest. (*Parviflórus*, small-flowered, a most inapplicable name.)

Common in rocky woods in the northeastern part of the state, especially along the north shore of Lake Superior. Michigan, Minnesota, and western Ontario to Alaska and California, southward in the Rocky Mountains to New Mexico and Mexico, also in the Black Hills of South Dakota. Blossoms in June and July, fruit ripe in August.

2. Rubus arcticus L. var. **grandiflorus** Ledeb. Fl. Ross. 2: 70. 1844.

ARCTIC RASPBERRY

A low, unarmed, nearly herbaceous perennial, rhizomes and bases of the stems slightly woody, stem 3–12 cm. high, more or less finely pubescent with prominent scale leaves at the base; leaves 3-foliolate, sparingly appressed pubescent on both sides, leaflets crenate-serrate, often entire towards the base, terminal leaflet rhombic to obovate, 2–3 cm. long, its petiolule about 2 mm. long, lateral leaflets somewhat smaller, broadly obovate, petiolules about 1 mm. long; stipules narrowly spatulate to lanceolate, about 5 mm. long; flowers usually solitary, terminal pedicel 2–5 cm. long; sepals narrowly lanceolate, acuminate, 8–10 mm. long, reflexed in anthesis; petals rose-colored, spatulate to obovate, with distinct claws, 9–13 mm. long; stamens numerous, filaments dilated clavate, incurved; drupelets many; fruit similar to that of *R. pubescens*, edible. (*Arcticus*, arctic; *grandiflórus*, large-flowered.)

Rare in cool swamps in the northern part of the state, reported as abundant in the vicinity of Baudette. Labrador to Alaska, south to Minnesota, and in the Rocky Mountains to Wyoming. Also in eastern Asia.

Typical *Rubus arcticus* occurs in northern Europe, Asia, and Labrador and the northern Rocky Mountains.

3. Rubus pubescens Raf. Med. Repos. 3²: 333. 1811.

DWARF RASPBERRY

R. triflorus Richards. 1823.

A low, unarmed, nearly herbaceous perennial, slightly woody at the base, flowering stems erect, 1–4 dm. high, sterile shoots trailing, 0.5–2 m.

long, both erect and trailing stems finely and sparsely pubescent; leaves 3-foliolate (rarely 5-foliolate), sparingly pubescent on both sides, leaflets sharply and usually doubly serrate, petioles slender 3–8 cm. long, sparingly pubescent; stipules generally very prominent, obovate to lanceolate, 5–20 mm. long; terminal leaflet rhombic-ovate, 3–10 cm. long, petiolule about 5 mm. long or less, lateral leaflets subsessile, obliquely ovate, often more or less 2-lobed; flowers erect, solitary or in 2–4-flowered cymes, pedicels puberulent, and sparingly glandular, 2–5 cm. long, slender; sepals ovate to broadly lanceolate, obtuse to acuminate, pubescent and glandular, 4–5 mm. long, reflexed in anthesis; petals white, erect, elliptic or oblanceolate, about as long as the sepals, short-clawed; hypanthium deeply concave; stamens numerous, filaments broad, linear to near the top, then somewhat hastate with a subulate tip; styles much shorter than the stamens; fruit globose, dark red, the drupelets not separating from the torus, edible. (*Pubéscens*, pubescent, not particularly applicable.)

Very abundant in the tamarack and spruce swamps of the northern and eastern parts of the state, less frequent in moist deciduous woods. Newfoundland, to British Columbia, south to New Jersey, Iowa, and Colorado. Blossoms in May and June, fruit ripe in July and August.

4. Rubus idaeus L. Sp. Pl. 492. 1753.

EUROPEAN RASPBERRY

A shrub closely resembling *R. strigosus* but differing in the lack of glandular bristles; young canes finely tomentose, becoming glabrate, sparingly armed with bristles or weak prickles; leaves of the first-year canes mostly 5-foliolate, those of the second-year twigs 3-foliolate, petioles, rachis, and midveins finely pubescent and with a few scattered prickles; peduncles and pedicels finely pubescent and generally bearing few to many hooked prickles; sepals ovate-lanceolate, long acuminate, tomentose, often with a few hooked prickles; petals dull white, elliptic, shorter than the sepals, stamens erect, not incurved; hypanthium broad and easily seen in the open flower; styles stouter than in *R. strigosus*; fruit red, sweet, drupelets tomentose. (*Idaéus*, Gr., of the woods.)

Native of Europe, the parent of many of our cultivated raspberries; escaping in adjacent states and probably also in Minnesota. Forms occurring native in the northern part of the state with similar pubescence have the floral characters of *R. strigosus* and are referable to varieties of that species. Blossoms in June, fruit ripe in July and August.

5. Rubus strigosus Michx. Fl. Bor. Am. 1: 297. 1803.

WILD RED RASPBERRY

A branching shrub 1–2 m. high, stems biennial, usually brownish or reddish, frequently glaucous, young twigs bristly, the bristles mostly gland-tipped, sometimes with scattered, hooked prickles, typically without puberulence or villous pubescence; leaves of the first year's canes 3–5-

foliolate, those of the flowering shoots 3-foliolate, petioles and rachis often bristly and mostly glandular, petioles 4–7 cm. long, terminal leaflet mostly ovate, sometimes 3-lobed, 5–10 cm. long, 3–7 cm. wide, rounded to cordate at the base, acuminate at the apex, petiolule of terminal leaflet 0.5–3 cm. long, lateral leaflets essentially sessile, obliquely ovate, rounded or somewhat narrowed at the base, somewhat smaller than the terminal leaflets, all leaflets dark green and sparingly pubescent or soon glabrate above, white tomentose beneath, sometimes with bristly prickles along the veins; in-

RUBUS STRIGOSUS

florescence cymose, 3–several-flowered, terminal and also often from the axils of the upper leaves, peduncles and pedicels glandular-bristly; sepals lanceolate, long acuminate, glandular and hispid, puberulent without, white tomentose within; petals dull white, elliptic, erect, 5–6 mm. long, shorter than the sepals; stamens curved inward, concealing the narrow hypanthium; styles very slender; fruit hemispheric, light red, separating from the torus, slightly acid, drupelets numerous, tomentose; stone of drupelet reticulate, not keeled on the back. (*Strigósus*, strigose, referring to the pubescence.)

Common in woods and thickets throughout the wooded parts of the state. Labrador to British Columbia, south to New Jersey, the mountains of North Carolina, Indiana, Nebraska, and in the Rocky Mountains to New Mexico. Also in eastern Asia. Blossoms in June, fruit ripe in July and August.

This species varies considerably in pubescence and other minor characters and has been segregated into a number of poorly defined species. It has also been frequently united with the European *R. idaeus* as a subspecies or variety. The following seems to be a fairly distinguishable geographical variety.

5a. R. strigosus Michx. var. **canadensis** (Richards.) comb. nov.

R. idaeus var. *canadensis* Richards. Bot. App. ed. 2, Frankl. Journ. ed. 1. 747. 1823.

Batidaea subarctica Greene, Leaflets, 1: 242. 1906.

Batidaea itascica Greene.

Stems, peduncles, and pedicels puberulent or finely pilose as well as bristly glandular. (*Canadénsis*, Canadian.)

Throughout the state but more common northward, where it appears to be the commonest form. Labrador to Alaska.

Occasional specimens occur with very few or no glandular bristles (*R. itascica*). Their pubescence then is almost identical with that of *R. idaeus*. The floral characters, however, agree with the American rather than with the European species.

6. Rubus occidentalis L. Sp. Pl. 493. 1753.

BLACK RASPBERRY, THIMBLE-BERRY

A shrub with biennial, arching stems, often rooting at the tips, 1–3 m. long, usually purplish brown and glaucous, glabrous, armed with stiff, hooked

RUBUS OCCIDENTALIS (×½)

prickles of moderate size, flowering twigs green; leaves 3-foliolate (rarely palmately 5-foliolate), dark green and glabrate above, slightly puberulent along the veins, white tomentose beneath, sharply and doubly serrate with mucronate teeth; petioles 3–8 cm. long, sparingly prickly, more or less pubescent; stipules linear to subulate; terminal leaflet ovate, rounded to cordate at the base, long acuminate at the apex, the petiolule 1–3 cm. long, lateral leaflets obliquely ovate, sometimes 2-lobed, their petiolules 1–2 mm. long; inflorescence cymose, corymb-like, 3–10-flowered, peduncles and pedicels more or less puberulent and prickly; sepals ovate-lanceolate, long acuminate, tomentose on both sides, 7–8 mm. long, reflexed at anthesis; petals white, elliptic, much shorter than the sepals, fugaceous; stamens somewhat incurved, styles very numerous, filiform, exceeding the stamens; unripe fruit bright red, becoming at length black with a bloom, hemispherical, edible; drupelets very many, tomentose, cohering and separating from the torus. (*Occidentális*, western, i.e., native of the New World.)

Common in rocky woods, thickets, and along fence rows, throughout the southern two-thirds of the state, frequently cultivated and freely escaping, also possibly native, most common in the deciduous forest area. New Brunswick, south to the mountains of Georgia; its native western distribution is very uncertain as it was early planted and escapes freely. Blossoms in late May and June, fruit ripe in July and August.

7. ×**Rubus neglectus** Peck, Rep. Reg. N. Y. 22: 53. 1869.

R. occidentalis×*strigosus.*

Resembling *R. occidentalis* but the leaves of the young shoots are sometimes pinnately 5-foliolate as in *R. strigosus* and the peduncles and petioles more or less glandular-hispid; fruit dark red, with the flavor of the red raspberry. (*Negléctus*, neglected, i.e., unrecognized.)

Fairly common in the southeastern part of the state where the two parents abound.

8. **Rubus nigrobaccus** L. H. Bailey, Evol. Nat. Fr. 379. 1898.

HIGH-BUSH BLACKBERRY

R. allegheniensis of Gray's Manual, ed. 7, Britton & Brown Ill. Flora, and Minn. T. and S. 1912. Probably not *R. allegheniensis* Porter (1896), which appears to have been based on abnormal, possibly hybrid, specimens.

A shrub with usually arching stems, 1–3 m. high; stems biennial, pubescent with both simple hairs and stalked glands, first year's canes stout, angled, armed with stout, frequently curved, flattened prickles, becoming nearly glabrous towards the base, frequently branching the first year; flowering branches armed with scattered, usually curved, flattened prickles; leaves

dark green and more or less pubescent above, densely soft pubescent beneath, petioles and petiolules pubescent and with stalked glands and a few hooked prickles, leaves of the turions mostly pedately 5-foliolate, petioles 5–12 cm. long, stipules linear-lanceolate, about 1 cm. long; leaflets all petioluled, ovate, rounded or subcordate at the base, abruptly acuminate at the apex, sharply and doubly serrate, middle leaflets 8–20 cm. long, 5–12 cm. wide, the lateral leaflets somewhat smaller; leaves of the flowering shoots 3-foliolate, petioles 2–6 cm. long, stipules lanceolate; terminal leaflet with petiolule 1–2 cm. long; lateral leaflets short-petioluled or subsessile; inflorescence racemiform, 1–2 dm. long, leafy-bracted below, pe-

RUBUS NIGROBACCUS
(×⅔)

duncles and pedicels pubescent and glandular-hispid, often somewhat prickly; flowers 2–3 cm. in diameter, white; sepals ovate, abruptly cuspidate-acuminate, 6–8 mm. long, more or less pubescent and slightly glandular-hispid without, tomentose within; petals broadly ovate to oblong-elliptic; fruit thimble-shaped, black, sweet, 1–1.5 cm. long, druplets numerous, small, glabrous. (*Nigrobáccus*, black berry.)

Common in woods and thickets and along roadsides in the southeastern part of the state as far north as the Twin Cities. Nova Scotia to Minnesota, south to North Carolina and Arkansas. Blossoms in late May and June, fruit ripe in August. Occasional belated flowers occur on the first year's canes in July and August.

8a. R. nigrobaccus L. H. Bailey, var. **sativus** Bailey, Evol. Nat. Fr. 379. 1898.

This variety differs from the typical species chiefly in the form of the leaves. The leaflets throughout are broader than in the type, the terminal leaflet of the turion leaves is broadly ovate, strongly cordate at the base, 10–15 cm. long, 8–10 cm. wide, lateral leaflets subcordate or rounded; leaves of the flowering shoots 3-foliolate or unifoliolate, the terminal leaflet of trifoliolate leaves ovate, subcordate at base, the unifoliolate leaves subcordate; inflorescence somewhat shorter and broader than in typical *R. nigrobaccus*, several of the lower flowers solitary in the axils of foliage leaves. In the late summer there is frequently a more or less leafy inflorescence at the top of the turion. (*Sativus*, cultivated.)

Apparently abundant in the extreme southeastern part of the state and occurring sparingly as far north as the Minnesota Valley. Quebec to Minnesota, south to Connecticut, and Pennsylvania. This form is the origin of many of the cultivated blackberries.

9. Rubus argutus Link, Enum. Hort. Berol. 2: 60. 1822.

TALL BLACKBERRY

A shrub with somewhat arching stems 1–2 m. high; stems biennial, more or less prominently angled, with scattered, long, straight, flattened prickles; first year's canes strongly angled, and furrowed, glabrous; growth of the second year dimorphic, with sterile, leafy branches, about 1–1.5 dm. long, sparingly hirsute, and fertile branches 5–12 cm. long, more strongly hirsute, more or less armed with short, recurved prickles; leaves of the turions pedately 5-foliolate, petioles 4–12 cm. long, armed with hooked prickles; stipules subulate, about 1 cm. long; leaflets rather thin, sparingly hairy above, tending to become glabrate, pubescent on the veins beneath, sharply and rather finely doubly serrate, terminal leaflet broadly ovate, petiolule 3–5 cm. long, abruptly long acuminate at the apex, rounded to subcordate at the base, petiolules of the intermediate leaflets 5–20 mm. long, outer leaflets subsessile or very short petioluled; leaves of the sterile branches of the second year's growth trifoliolate, generally more pubescent than the leaves of the turions, leaflets broadly ovate, mostly rounded or somewhat narrowed at the base; leaves of the flowering shoots mostly unifoliolate or nearly wanting, the basal leaf commonly 3-foliolate, with cuneate, obovate terminal leaflets; inflorescence a corymb-like cyme, 4–12-flowered, the lower bracts foliaceous, peduncle and pedicels hirsute, not glandular; flowers white, about 2 cm. in diameter; sepals ovate, abruptly acuminate, 5–6 mm. long, sparsely villous without, tomentose within; petals broadly obovate,

about 1 cm. long; fruit somewhat elongate, 1–1.5 cm. long, black, drupelets about 30, large, glabrous. (*Argútus*, sharp.)

In woods and thickets, southeastern to east central parts of the state. Nova Scotia to Minnesota, south to North Carolina and Kansas. Blossoms in June, fruit ripe in July and August.

10. Rubus frondosus Bigel. Fl. Bost. ed. 2. 199. 1826.

LEAFY-FLOWERED BLACKBERRY

A shrub with somewhat arching stems 1–2 m. high; stems biennial, more or less prominently angled, with scattered, slightly curved prickles; first year's canes slightly angled, glabrous; leaves of the turions pedately 5-foliolate, petioles 6–12 cm. long, sparingly armed with hooked prickles, stipules about 1 cm. long; leaflets rather thin, sparingly hairy above, soft pubescent beneath, sharply and irregularly doubly serrate; terminal leaflet broadly ovate, abruptly acuminate at the apex, rounded to cordate at the base, petiolule 3–5 cm. long, petiolules of intermediate leaflets 1 cm. long or less, outer leaflets subsessile; flowering branches villous, not glandular, the leaves 3-foliolate or the upper unifoliolate, the trifoliolate leaves with petioles 3–8 cm. long, the terminal leaflet broadly ovate, acute or short acuminate at the apex, mostly rounded at the base, petiolule 5–15 mm. long; lateral leaflets obliquely ovate, subsessile, unifoliolate leaves elliptic-ovate to lance-ovate; inflorescence a leafy-bracted cyme, 6–10-flowered, often with a few solitary pedicels in the axils of the foliage leaves, pedicels densely villous, not glandular; flowers white, about 2 cm. in diameter; sepals broadly ovate, short acuminate, 5–6 mm. long, villous without, tomentose within; petals broadly ovate, about 1 cm. long; fruit somewhat elongated, 1–1.5 cm. long, black, drupelets large, glabrous. (*Frondósus*, leafy, referring to the leafy-bracted inflorescence.)

In rich woods and thickets, southeastern part of the state. Southern New England to Minnesota and Iowa, south to Virginia and Kansas. Blossoms in June, fruit ripe in July and August.

11. Rubus flagillaris Willd. Enum. Pl. Hort. Berol. 549. 1809.

DEWBERRY

R. villosus Ait. (?). Not *R. villosus* Thunb.
R. procumbens Muhl.

A shrub with prostrate or trailing stems, 1–2 m. long; stems biennial, with scattered, weak, recurved prickles; first year's canes nearly terete, essentially glabrous; flowering branches ascending or erect, 1–3 dm. high, villous, sparingly armed with recurved prickles or nearly unarmed, leaves of the turions 3–5-foliolate; petioles 3–6 cm. long, more or less prickly;

stipules linear-lanceolate to subulate, leaflets rather firm, green on both sides, glabrous or nearly so above, pubescent on the veins beneath but not velvety, coarsely doubly serrate with triangular ovate teeth; terminal leaflet rhombic-ovate, with petiolule 1–3 cm. long, rounded or subcordate at the base, mostly abruptly acuminate at the apex; lateral leaflets ovate to obovate, those of trifoliolate leaves usually 2-lobed, subsessile or with petiolules up to 5 mm. long; leaves of the flowering shoots 3-foliolate or the upper ones frequently unifoliolate, the leaflets obovate or oblanceolate, 3–5 cm. long, acute at both ends, subsessile or the median one short-petioluled;

RUBUS FLAGILLARIS
(×½)

flowers solitary in the upper axils, and frequently with a 2–4-flowered terminal cyme; pedicels more or less villous, occasionally sparingly prickly, without stalked glands; flowers white, 2–3 cm. in diameter; sepals elliptic-ovate or oblong, acuminate, 5–7 mm. long, sparingly villous without, tomentose within; petals elliptic-obovate, 10–15 mm. long; fruit black, hemispherical, of inferior quality; drupelets large. (*Flagilláris*, whip-like, referring to the long, slender turions.)

Blossoms in June, fruit ripe in July and August. Chiefly on acid soils, common in the east central and southeastern parts of the state. Southern Maine to Minnesota, south to Virginia and Missouri.

Closely allied to *R. flagillaris* is the following, which has been described as a species, but appears to be of doubtful taxonomic rank. It may represent an extreme variant of *R. flagillaris*, or a hybrid between that species and one of the erect blackberries.

11a. Rubus plicatifolius Blanchard, Rhodora, 8: 149. 1906.

This differs from *R. flagillaris* in having the leaves rather strongly pubescent on the under side, and in the flowering branches, which are shorter, with more compact inflorescences often bearing 4–8 flowers. (*Plicatifólius*, having plicate leaves, i.e., folded like a fan.)

Specimens have been seen from Hennepin and Ramsey counties. Maine to Ontario and New York, also Wisconsin and Minnesota.

12. Rubus Baileyanus Britt. Mem. Torr. Bot. Club, 5: 185. 1894.

DEWBERRY, BAILEY'S BLACKBERRY

A shrub with trailing stems 1–2 m. long; stems biennial, glabrous, sparingly armed with small, recurved prickles; first year's canes, obscurely angled, glabrous; flowering branches erect or nearly so, 1.5–3 dm. high, sparingly villous and armed with scattered, weak, recurved prickles; leaves of the turions trifoliolate, rarely 5-foliolate; petioles 3–5 cm. long, pubescent, sparingly armed with weak, recurved prickles; stipules subulate 5–10 mm. long; leaflets thin, sparingly pubescent or nearly glabrate above, pubescent beneath, coarsely doubly serrate, the teeth broad and mucronate; the terminal leaflet broadly ovate, subcordate at the base, abruptly acuminate at the apex 5–7 cm. long, petiolule 1–2 cm. long, lateral leaflets broadly ovate, somewhat rhombic, subsessile; leaves of the flowering shoots trifoliolate or the upper usually unifoliolate, leaflets of the trifoliolate leaves somewhat lobed, coarsely doubly serrate, acute or rounded at the base, acute at the apex, the terminal leaflet elliptic-ovate with a petiolule about 1 cm. long, the lateral obliquely ovate and subsessile; unifoliolate leaves round-ovate or cordate, about as broad as long, up to 8 cm. long, frequently 3-lobed; flowers solitary (rarely in 2–3-flowered cymes) in the axils of the upper leaves, and 1 or sometimes 2–3 at the ends of the branches, pedicels villous; flowers white 2–3 cm. in diameter; sepals ovate, 5–6 mm. long, mucronate or rarely foliaceous at the tip, villous without, tomentose within; petals elliptic, 10–14 mm. long; fruit hemispheric, 10–15 mm. long, black, of excellent quality; drupelets large, glabrous. (*Baileyánus*, named for L. H. Bailey.)

In woods and thickets, chiefly in the southeastern part of the state, possibly as far north as Hennepin County. Massachusetts to Ontario and Minnesota, south to North Carolina and Oklahoma. This species is directly or indirectly the source of nearly all the cultivated dewberries. Blossoms in late June, fruit ripe in July and August.

13. **Rubus setosus** Bigel. Fl. Bost. ed. 2. 198. 1824.

LOW-BUSH BLACKBERRY

A low shrub with ascending or arching stems, soon becoming nearly prostrate, 2–5 dm. high, rather densely covered with slender retrose bristles, more or less interspersed with shorter, gland-tipped setae; first year's canes terete, flowering branches erect or nearly so, 1–2 dm. high, less bristly than the turions; leaves of the turions 3–5-foliolate; petiole 4–8 cm. long, re-

RUBUS SETOSUS
(×½)

trorsely bristly, more or less glandular and somewhat puberulent; stipules lanceolate, 10–15 mm. long; leaflets rather firm and bright green, glabrous on both sides or somewhat puberulent along the veins beneath, coarsely doubly serrate; terminal leaflet obovate, narrowed towards the base, acute or slightly acuminate at the apex, 4–7 cm. long, petiolule about 1 cm. long or less; lateral leaflets obliquely ovate to obovate, sometimes 2-lobed, subsessile; leaves of the flowering shoots trifoliolate, leaflets similar to those of the turion leaves, but smaller, the terminal one subsessile; inflorescence mostly a more or less elongated raceme-like cyme, sometimes compounded below, 3–7-flowered, peduncle and pedicels glandular-hispid, puberulent and more or less bristly; flowers white, about 1.5 cm. in diameter; sepals

ovate, 3–4 mm. long, obtuse or short-mucronate, glandular-hispid and puberulent without, tomentose within; petals obovate, 5–8 mm. long; fruit hemispherical, about 1 cm. in diameter. (*Setósus*, bristly.)

Common in acid meadows, chiefly in Anoka and Ramsey counties, and probably northward. Prince Edward Island, Vermont, and Connecticut, also Wisconsin and Minnesota. Blossoms in June and July, fruit ripe in July and August.

The amount of glandular hispidity on the pedicels and calyx varies greatly. Typically it is strongly developed, but specimens occur with very few stalked glands and occasionally with none. *R. vermontanus* Blanchard, appears to be a glandless extreme with narrow racemose inflorescence. No Minnesota specimens have been seen that are entirely without stalked glands but in one plant from Crow Wing County they occur only on a single flower, other flowers on the same specimen being entirely without glands.

R. setosus hybridizes freely with *R. flagillaris* throughout our area, and various intermediate forms occur.

3. RHODOTYPOS Sieb. & Zucc. Flor. Jap. 1: 187. 1835.

A genus of a single known species, native of Japan. (*Rhodótypos*, rose type, from the resemblance of the flowers to a small single rose.)

1. Rhodotypos kerioides Sieb. & Zucc. Flor. Jap. 1: 187. 1835.

R. tetrapetala Mak. 1903.
R. scandens (Thunb.?) Mak. 1913.

A somewhat spreading, loosely branched, unarmed shrub, 1–2.5 m. high; young twigs olive-green, becoming brownish towards the end of the season, second-year twigs reddish brown; leaves opposite, simple, ovate, 4–10 cm. long, 2–6 cm. wide, mostly rounded at the base, acuminate at the apex, sharply and doubly serrate, bright green on both sides, glabrous above, pubescent beneath, or glabrate in age; petioles very short; stipules subulate, caducous; flowers borne singly at the ends of leafy shoots, white, 2.5–4 cm. in diameter; sepals 4, large, ovate, sharply serrate or toothed; petals 4, nearly orbicular; stamens numerous, much shorter than the spreading petals; carpels 2–6, enclosed in the short, urn-shaped receptacle; fruit consisting of several nearly black, dryish, shining drupelets, surrounded by the large persistent sepals, persisting until late in the autumn. (*Tetrapétala*, having four petals.)

Occasionally planted but not sufficiently winter hardy to make a successful ornamental shrub. Flowers in June, and frequently for a second time in August.

4. PHYSOCARPUS Maxim. Acta Hort. Petrop. 6: 219. 1879.

NINEBARK

Branching shrubs with shreddy bark and alternate, simple, palmately lobed, stipulate leaves; flowers white or pinkish, numerous, in umbel-like corymbs; hypanthium broadly companulate; sepals 5, valvate; petals 5, imbricate; stamens 20–40, in 2–3 cycles, inserted along the edge of the disk; carpels 1–5, more or less connate at the base; styles terminal; stigma capi-

tate; fruit, 1–5 inflated follicles, splitting halfway to the base along both sutures. (*Physocárpus*, bladder fruit.)

A genus of about 5 species and several varieties, natives of North America and northeastern Asia.

1. Leaves becoming nearly glabrous beneath, follicles glabrous 1. *P. opulifolius*
2. Leaves mostly stellate pubescent beneath, follicles stellate pubescent 1a. *P. opulifolius* var. *intermedius*

PHYSOCARPUS OPULIFOLIUS

1. Physocarpus opulifolius (L.) Maxim. Acta Hort. Petrop. 6: 219. 1879.

COMMON NINEBARK

Spiraea opulifolia L. 1753.
Opulaster opulifolius Kuntze, 1891.

A shrub 1–3 m. high with arching or recurved branches; young twigs yellowish green, soon turning brownish, slightly angled, glabrous or nearly so; older twigs and branches grayish brown, the bark fissured and peeling off in strips and layers; leaves mostly ovate in outline, and more or less

distinctly 3-lobed, 3–7 cm. long, often larger on sterile shoots, subcordate, truncate, rounded or narrowed at the base, mostly acute at the apex, the margin irregularly crenate-dentate, dark green above, paler beneath, glabrous or somewhat pubescent in the axils of the veins; petioles slender, 1–2 cm. long; stipules caducous; peduncle and pedicels glabrous or the latter more or less pubescent; flowers white, about 9–12 mm. in diameter; follicles 3–5, glabrous, shining, much exceeding the calyx and conspicuous when ripe. (*Opulifólius*, leaves as in *Viburnum Opulus*.)

Mostly along river banks and in rocky places. Occurring native only in the northeastern part of the state in the vicinity of Lake Superior. Quebec and New England west to Minnesota, south to Florida and Illinois. Often cultivated. Blossoms in June and July.

A form with yellow leaves (f. *luteus*) known as Goldleaf Ninebark is planted to some extent in the state.

1a. P. opulifolius var. **intermedius** (Rydb.) Robinson, Rhodora, 10:32. 1908.

Resembling the species in habit and inflorescence but differing in the frequently narrower leaves, which are mostly more or less stellate-pubescent beneath and in the duller, permanently stellate-pubescent follicles. (*Intermédius*, intermediate.)

Along streams, rocky hillsides, edges of thickets, etc., common throughout the deciduous forest area of the southeastern part of the state as far north as the Twin Cities. Southern Ontario and Western New York to South Dakota, south to Illinois, Alabama, and Arkansas. Flowers in June, fruit ripe in July and August.

5. SPIRAEA L. Sp. Pl. 489. 1753.

SPIREA

Shrubs with alternate, simple, sometimes pinnately lobed leaves without stipules; flowers small, white, pink or reddish, in umbel-like racemes, corymbs or panicles; hypanthium campanulate or cup-shaped, bearing a disk; sepals 5, persistent; petals 5; stamens 20–50, distinct, inserted with the petals along the edge of the disk; carpels generally 5, superior, distinct; ovules 2–many; fruit composed of several follicles. (*Spiraéa*, probably from the Greek *Speira*, meaning wreath.)

A genus of about 75 species of the north temperate zone, only two of which are native to the state. Many species are cultivated as ornamental shrubs and among these several are of garden origin.

1. Flowers pure white, in sessile umbels or simple corymbs.
   a. Flowers borne on old wood, in sessile leafless umbels, not on new leafy shoots (sometimes a few small leaves at the base of the clusters), leaves pinnately veined.
      (1) Leaves ovate or ovate-oblong, pubescent at least when young
      1. *S. prunifolia*

(2) Leaves narrowly lanceolate to oblanceolate, glabrous.
(a) Leaves narrowly lanceolate, flowers 6–8 mm. in diameter, 2–3 in each cluster 2. *S. Thunbergii*
(b) Leaves oblanceolate, flowers 8–11 mm. in diameter, 2–5 in each cluster 3. ×*S. arguta*

b. Flowers in many-flowered corymbs, terminating short leafy shoots of the season, leaves palmately 3–5-veined 4. ×*S. Van-Houttei*

2. Flowers pink or white, sometimes with slight tinge of pink, in compound inflorescences (peduncle branched).
a. Flowers in corymbs or rounded clusters.
(1) Branches terete, pubescent at least when young, flowers pink 5. *S. japonica*
(2) Branches angled, nearly or quite glabrous, flowers pink to whitish 6. ×*S. Bumalda*

b. Flowers in panicles.
(1) Leaves nearly or quite glabrous, oblong to oblanceolate, flowers white 7. *S. alba*
(2) Leaves pubescent or tomentose beneath.
x. Leaves grayish or whitish beneath; fruit glabrous 8. ×*S. Billiardii*
y. Leaves tawny beneath; fruit pubescent when young, becoming glabrate 9. *S. tomentosa* var. *rosea*

1. **Spiraea prunifolia** Sieb. & Zucc. Flor. Jap. 1: 131. 1835.

BRIDAL WREATH

A shrub 1–2 m. high, with slender, more or less erect branches; young twigs slightly pubescent, becoming glabrous; leaves ovate to oblong, 2.5–5 cm. long, 1–2 cm. broad, narrowed towards the base, rounded or acutish at the apex, finely serrate except at the base, glabrous or nearly so above, pubescent beneath; petioles about 6 mm. long; flowers in 2–7-flowered sessile umbels, appearing before the leaves, white, 10–12 mm. in diameter; pedicels slender, 1–2 cm. long; sepals ovate, obtuse, about 1.5 mm. long; petals pure white, broadly obovate or nearly orbicular, 5 mm. long. exceeding the stamens; follicles glabrous. (*Prunifólia*, with leaves like a plum tree.)

The double-flowered form of this species is the one most common in cultivation. The stems are subject to killing-back in the winter as a result of which the shrub remains low. Native of China and Japan.

2. **Spiraea Thunbergii** Sieb. ex Blume, Bijdr. 3: 115. 1825.

A low shrub 5–12 dm. high, with numerous slender arching branches, reddish brown, at first more or less pubescent, in age becoming glabrous and the outer bark shreddy; leaves linear-lanceolate, 2–4 cm. long, 2–8 mm. wide, glabrate, gradually narrowed towards both ends, sharply serrate, petioles 1–3 mm. long; flowers in sessile umbels, appearing just before the leaves, 2–3 in each cluster, white, 6–8 mm. in diameter; sepals ovate-triangular; petals obovate more than twice as long as stamens; pedicels slender, glabrous, 5–10 mm. long; follicles projecting prominently when ripe. (*Thunbérgii*, named for the Swedish botanist, Thunberg.)

China and Japan. Blossoms in late April or early May. The tips of the branches generally kill back in winter leaving them naked except for the prominent unopened buds, somewhat disfiguring the appearance of the shrub. The following hybrid, derived in part from this species, is frequently cultivated in the state.

3. ×Spiraea arguta Zabel, Deut. Gartenz. 3: 494. 1884.

S. Thunbergii×*multiflora.*

A low shrub of similar habit but more robust; leaves oblanceolate, 1.5–3 cm. long, 5–10 mm. broad, narrowed towards the base, acute at the apex, serrate above the middle, glabrous on both sides; flowers in numerous, 2–5-flowered umbels, white, 8–11 mm. in diameter, pedicels 12–15 mm. long. (*Argūta*, bright.)

The ends of the branches kill back during winter as in the preceding species.

SPIRAEA ARGUTA SPIRAEA VAN-HOUTTEI

(×⅔)

4. ×Spiraea Van-Houttei (Briot) Zabel, Deut. Gartenz. 3: 496. 1884.

BRIDAL WREATH

S. cantoniensis×*trilobata.*

A shrub 1–2 m. high with arching branches; bark on young branches smooth, yellowish brown, on older parts gray and somewhat shreddy; leaves rhombic ovate, cut-serrate or obscurely lobed, narrowed at the base, dark green above, pale bluish green beneath, 1.5–4 cm. long; flowers in numerous many-flowered umbels, white, 5–7 mm. broad; sepals upright or spreading in fruit; petals twice as long as the stamens. (*Van Houttei*, named for Louis Van Houtte, a Belgian horticulturist.)

Very extensively cultivated as an ornamental shrub. A very handsome, early flowering spiraea of garden origin, a hybrid between *S. cantoniensis* and *S. triloba*. Flowers in May and June; quite hardy and endures the Minnesota winter climate without injury.

5. Spiraea japonica L. f. Suppl. 262. 1781.

JAPANESE SPIREA

An upright shrub, 8–15 dm. high; young branches more or less tomentose, one-year-old twigs reddish brown, glabrous or remaining more or less pubescent; leaves oval, narrowly ovate to oblong-lanceolate, 4–11 cm. long, 1.5–4 cm. wide, narrowed at the base, acute or acuminate at the apex, doubly and sharply serrate, the serrations extending almost to the base, bright green above, bluish or grayish green beneath, sparsely pubescent on both surfaces or glabrous; petioles 2–7 mm. long; inflorescence terminal, on elongated shoots of the season, consisting of several aggregated corymbs, rather loose; flowers pink, 4–6 dm. in diameter; hypanthium and sepals pubescent; petals broadly obovate or nearly orbicular; stamens very prominent; sepals spreading or reflexed in fruit; follicles erect or nearly so, glabrous. (*Japónica*, Japanese.)

This species varies considerably in the color of the flowers, size of leaves, and degree of pubescence. Native of China and Japan. Flowers in July or August, fruit ripe in September and October.

6. ×Spiraea Bumalda Koehne, Dendrol. 216. 1893.

S. japonica×*albiflora*.

A more or less erect shrub, about 5 dm. high; bark brown, striped; young shoots with small ridges running from the base of the petiole; leaves ovate-lanceolate, sharply and mostly doubly serrate, narrowed towards the base, acute at the apex, dark green above, paler beneath, glabrous on both sides, 2–8 cm. long, 1.2–2 cm. wide; flowers numerous, in corymbs, whitish to pink; follicles diverging when ripe. (*Bumálda*, a generic name, coming originally from J. A. Bumalda, an Italian botanist of the seventeenth century.)

Of garden origin, a hybrid between *S. japonica* and *S. albiflora*. Numerous forms are cultivated among which the most commonly planted within the state is the horticultural variety, Anthony Waterer, a low, compact shrub, flowers pink-purple, very numerous in compound cymes. Most of the branches kill back almost to the ground in the winter, but it renews itself very rapidly from the basal parts and bears the flowers on the season's growth. Flowers in July and August. The variety *Froebelii* is similar in habit and foliage but has flowers of deeper and better color.

7. Spiraea alba DuRoi, Harbk. Baumz. 2: 430. 1772.

S. salicifolia of Am. authors and Minn. T. and S. 1912, not *S. salicifolia* L., which is Asiatic.

An erect shrub 5–12 dm. high; twigs round or somewhat angled, reddish or yellowish brown, glabrous or nearly so, old stems with grayish, somewhat exfoliating outer bark; leaves from broadly to narrowly oblanceolate or narrowly oblong, 3–6 cm. long, 7–15 mm. broad, narrowed at the base, mostly acute at the apex, sharply and finely serrate, glabrous on both sides or sparingly pubescent along the midvein beneath; petiole 2–6 mm. long, often somewhat tomentose on the margins; inflorescence a terminal panicle, somewhat leafy at the base, axis, peduncles, and pedicels more or less puberulent or tomentose; flowers numerous, white, 6–7 mm. in diameter; hypan-

thium turbinate, puberulent to glabrous or nearly so; sepals about as long as the hypanthium, becoming erect or incurved in fruit; petals nearly orbicular, with short claw; stamens very numerous, exceeding the petals; pedicels 2–5 mm. long; follicles glabrous. (*Álba*, white, referring to the flowers.)

In low ground, common throughout the state, except in the southwest corner where it is less frequent. New York to Saskatchewan, south to North Carolina and Missouri. Blossoms from the latter part of June until August.

Occasional forms occur which approach the eastern *S. latifolia* in the broader (up to 2.5 cm.) leaves with coarser sometimes double serrations but in the pubescence as well as the form of the inflorescence they agree more closely with *S. alba*.

SORBARIA SORBIFOLIA

SPIRAEA TOMENTOSA VAR. ROSEA (×½)

SPIRAEA ALBA

8. ×Spiraea Billiardii Herincq, L'Hort. Franc. 1855.

S. Douglasii × *salicifolia*.

A shrub 1–2 m. high, with erect nearly simple, brownish pubescent branches; leaves oblong to oblong-lanceolate, 5–8 cm. long, narrowed towards the base, and tapering generally acute at the apex, sharply and more or less doubly serrate, glabrous above, at first sparsely grayish tomentose beneath, becoming nearly or quite glabrous with age; petiole 4–5 mm. long; inflorescence a narrow, elongated panicle, densely flowered, pubescent throughout, flowers pink, 5–6 mm. in diameter; hypanthium and sepals pubescent; petals nearly orbicular; stamens much exserted; follicles glabrous. (*Billiárdii*, named for the French florist in whose garden it originated.)

This hybrid resembles very closely others in which *S. Douglasii* figures as one of the parents, and it is doubtful if the form handled by the horticulturists as the above combination actually is what it purports to be. As yet cultivated only to a limited extent within the state.

9. Spiraea tomentosa L. var. **rosea** (Raf.) Fernald, Rhodora, 14: 188. 1912.

HARDHACK, STEEPLE-BUSH

An erect shrub 3–12 dm. high, stems covered with a tawny or rusty tomentum, at length becoming glabrate and reddish brown; leaves ovate to oblong or ovate-lanceolate, 2–6 cm. long, 1–2.5 cm. wide, narrowed or somewhat rounded at the base, usually acute at the apex, coarsely crenate-serrate, dark green and slightly puberulent above, densely pale tomentose beneath, or more frequently tawny or rusty, the veins prominent; petiole 2–3 mm. long; inflorescence paniculate, 1–2 dm. long, terminating in a long, slender point, somewhat branched below, the lower branches slightly compound, tomentose throughout; flowers pink, purplish, or rarely white, crowded, short-pedicelled; hypanthium hemispherical, tomentose, sepals triangular, reflexed, petals broadly ovate or suborbicular about 1.5 mm. long, follicles about 2.5 mm. long, short tomentose soon becoming glabrate. (*Tomentósa*, tomentose, referring to the woolly pubescence of the leaves and stem; *rósea*, rosy, referring to the color of the flowers.)

Frequent, especially in low, acid soil in the northeastern part of the state, and as far south as the Twin Cities. New York to Minnesota, south in the mountains to South Carolina.

All Minnesota specimens of this species appear to belong to the variety *rosea*. The typical species, found in the eastern part of the United States, has a more freely branched and more crowded inflorescence, with the individual flowers so closely packed that their pedicels cannot be seen, and densely lanate follicles, which are very tardily glabrate. Despite the name there is no color difference between the species and its variety.

6. SORBARIA A. Br. in Aschers. Fl. Brandenb. 177. 1864.

Woody or semiwoody plants; leaves deciduous, alternate, compound, odd-pinnate with conspicuous stipules; flowers white, perfect, small, and numerous in terminal panicles; hypanthium hemispheric; sepals 5, imbricate, early reflexed; petals 5, imbricate, spreading; stamens numerous, borne on the margin of the disk; carpels 5, opposite the sepals, connate below; styles terminal or nearly so; ovules several; follicles thin, dehiscent along both sutures; seeds few. (*Sorbária*, resembling *Sorbus* in foliage.)

A genus of about 8 species, natives of northern and eastern Asia. The following species is cultivated in Minnesota.

1. Sorbaria sorbifolia A. Br. in Aschers. Fl. Brandenb. 177. 1864.

Spiraea Sorbifolia L. 1753.
Basilima sorbifolia Raf. 1836.

An erect, soft-woody shrub 1–2 m. high, spreading freely by suckers; young twigs more or less pubescent; leaves 1–4 dm. long, leaflets 13–23, lanceolate, narrowed at the base, long acuminate at the apex, sharply serrate, often stellate pubescent beneath when young; panicles terminal, 15–30 cm. long; flowers white, with yellowish or reddish center, 7–8 mm. in diameter; hypanthium glabrous; sepals ovate; petals obovate, clawed, about 3 mm. long; stamens numerous and conspicuous; follicles glabrous. (*Sorbifólia*, with leaves like *Sorbus*.)

Native of Asia from the Ural region to Japan, frequently cultivated, spreading freely by underground shoots, and occasionally escaped. Flowers in May and June.

7. ROSA L. Sp. Pl. 491. 1753.

ROSE

Bushes sometimes with very long canes, which take on a semi-climbing or vine-like habit; stems usually armed with prickles, often with a pair of unusually large ones just below each node (infrastipular prickles); buds scaly; leaves deciduous or in warm climates sometimes evergreen, pinnately compound with 3–11 leaflets (simple in one Asiatic species), stipules persistent, large, mostly adherent to the petiole with short free auricles at the top; flowers perfect, hypanthium deeply cup-shaped, sepals 5, petals 5 (numerous in many cultivated forms), stamens many, pistils many, the ovaries free, becoming achenes in fruit, the styles sometimes united, sepals, petals, and stamens borne on the upper edge of the hypanthium, ovaries borne on its inner surface completely concealed by the cup; fruit a "hip" formed by the fleshy hypanthium containing the numerous bony achenes; seed solitary, with endosperm. (*Rosá*, the classical Latin name.)

A very large genus of the northern hemisphere. The limits of the species are exceedingly difficult to define owing to the variability of the species themselves, and the hybridizing of different species whenever they occur together. These two characteristics of rose species have served as a foundation for the great and ever increasing number of cultivated forms of roses. Our native roses need further study, especially in the living state. In collecting roses for study it is well to have all parts of the plant—flowering branches, fruit, and young non-flowering shoots. Roses that have been cut down at or before the usual flowering time often flower late in the season on new, rapidly grown shoots, which differ greatly in appearance from the normal type of the species.

1. Upright shrubs; styles free, scarcely exserted from the mouth of the hypanthium.
   a. Native species and introduced species that have become established; flowers pink (rarely nearly white) with 5 petals.

(1) Infrastipular prickles well developed, with or without other prickles.
(a) Leaflets mostly 5 (rarely 7); stems greenish, mostly armed with bristles as well as slender prickles; sepals about 2 cm. long, soon reflexed and deciduous 1. *R. humilis*
(b) Leaflets 7–9; stems red-purple, bristly only at base; prickles with a conspicuously enlarged pale base; sepals about 1.5 cm. long, erect and persistent in fruit.
x. Leaflets puberulent, prickles slender about 5 mm. long 2. *R. Macounii*
y. Leaflets glabrous, prickles stouter, about 10 mm. long 2a. *R. Woodsii*
(2) Definite infrastipular prickles wanting, prickles needle- or bristle-like with scarcely enlarged bases.
(a) Leaflets mostly 5, their serrations coarse and spreading; whole plant very prickly; flowers mostly solitary [3. *R. acicularis*].
x. Hip elongated; serration of leaflets mostly simple 3. *R. acicularis* (*typical*)
y. Hip spherical.
(x) Leaflets doubly serrate 3a. *R. acicularis* var. *Bourgeauiana*
(y) Serration of leaflets mostly simple 3b. *R. acicularis* var. *rotunda*
(b) Leaflets 7–11, their serrations fine and ascending; flowers mostly in corymbs.
x. Shrub mostly about 1 m. high; twigs red-purple, unarmed or sparingly armed; corymbs few-flowered, borne on the old wood; leaflets mostly 7 [4. *R. blanda*].
(x) Leaflets simply serrate, rachis of leaf not glandular.
m. Leaflets pubescent 4. *R. blanda* (*typical*)
n. Leaflets glabrous 4a. *R. blanda* var. *glabra*
(y) Leaflets doubly serrate 4b. *R. blanda* var. *acicularioides*
y. Plant mostly 3–4 dm. high; twigs green (sometimes tinged with red on one side), mostly densely bristly-prickly; corymbs often many flowered, borne on young shoots as well as on the old growth; leaflets mostly 9–11. [5. *R. arkansana*].
(x) Leaflets glabrous 5. *R. arkansana* (*typical*)
(y) Leaflets pubescent.
m. Hip globular 5a. *R. arkansana* var. *suffulta*
n. Hip top-shaped 5b. *R. arkansana* var. *Bushii*

b. Cultivated species, occasionally persisting in the vicinity of old gardens; flowers of various colors, petals often numerous.
(1) Leaflets 2–5 cm. long.
(a) Leaflets downy beneath, not glandular or very slightly so.
x. Twigs red with hooked infrastipular prickles; leaflets thin; flowers pink 6. *R. cinnamomea*
y. Twigs grayish brown, without infrastipular prickles; leaflets thick and rugose; flowers red or white 7. *R. rugosa*
(b) Leaflets nearly or quite glabrous beneath, more or less glandular, thick and firm (no infrastipular prickles).
x. Stipules not fimbriate, flowers large.
(x) Prickles slender; leaflets obtuse, rugose 8. *R. gallica*
(y) Prickles stout, hooked; leaflets usually acute 9. *R. centifolia*
y. Stipules fimbriate, flowers about 2 cm. in diameter 15. *R. multiflora*

(2) Leaflets 1–2 cm. long.

(a) Foliage glandular, fragrant.

x. Stems green, with stout infrastipular prickles, flowers pink 10. *R. rubiginosa*

y. Stems brown, without infrastipular prickles; flowers yellow 11. *R. foetida*

(b) Foliage glabrous, not scented; stems brown.

x. Stems erect, densely bristly-prickly; flowers mostly white 12. *R. spinosissima*

y. Stems arching, with scattered prickles; flowers yellow 13. *R. Hugonis*

2. Shrubs with long, vine-like canes requiring support; styles united to form an exserted column, cultivated.

a. Stipules nearly entire, leaflets 3–5 14. *R. setigera*

b. Stipules fimbriate, leaflets mostly 9 15. *R. multiflora*

1. Rosa humilis Marsh. Arb. Am. 136. 1785.

R. carolina L. Sp. Pl. 492. 1753, not *R. carolina* L. 1762 nor of later authors.*

Low shrub with greenish stems, 3–10 dm. high; young growth very bristly and armed with straight slender infrastipular prickles 5–8 mm. long, branches with infrastipular prickles or unarmed; leaves with 5 or rarely 7 leaflets; leaflets elliptic or lance-elliptic, rarely obovate, apex acute or rarely obtuse, base wedge-shaped, margin sharply serrate with ascending teeth, upper surface glabrous, lower surface paler, glabrate or pubescent along the veins, midrib prominent, the other veins rather obscure, upper leaflets 1–3 cm. long, lower somewhat smaller, third pair when present much reduced; petiole and rachis glabrous or sparingly pubescent; stipules very narrow, nearly glabrous, entire or with a few glandular teeth; flowers mostly solitary, pedicel and hypanthium usually glandular-hispid, sepals mostly with narrow lateral lobes, 1.5–2 cm. long, mostly very glandular-hispid on the outside, tomentose within; petals pink, flower about 5 cm. wide; calyx reflexed after anthesis and soon deciduous; hip globose or somewhat flattened, red; achenes dark brown, slender, about 4.5 mm. long, attached mainly to the bottom of the hypanthium. (*Húmilis*, low, humble.)

Apparently very rare in Minnesota, and confined to the eastern border of the state. The only specimens seen are from Anoka and Chisago counties. Maine to Minnesota, south to the Gulf of Mexico.

Roses of this group with infrastipular prickles, deciduous calyx, and achenes borne in the bottom of the hypanthium are abundant in eastern North America, chiefly in regions of acid soil. This is the only representative of the group that reaches Minnesota.

* This rose appears to be the original type of *Rosa carolina* L. The name was later applied by Linnaeus himself to another species, and this usage has been followed by most authors. To restore the name to this species is likely to produce endless confusion. It seems better to reject the name entirely.

2. Rosa Macounii Greene, Pittonia, 4: 10. 1899.

Rosa Woodsii of Minn. T. and S. 1912, not *R. Woodsii* Lindl.

Stems 2–20 dm. high; young woody twigs glossy reddish brown; prickles slender, straight or slightly bent at the base, 2–9 mm. long with a conspicuously enlarged base, infrastipular prickles well developed, often the only ones present on flowering branches, young shoots from the rhizome

Native Species of Rosa
Rosa arkansana, Rosa Macounii (above); Rosa acicularis, Rosa blanda (below)

often with numerous other prickles, some of them as large as the infrastipular ones; leaves with 5–9 leaflets; leaflets elliptical or obovate with petiolules 1–2.5 mm. long, thin, apex rounded, base rounded or somewhat wedge-shaped, margin sharply and simply serrate except at the base, upper surface dull green, glabrous, lower surface whitish, puberulent with a few longer hairs, the midrib and principal veins somewhat prominent beneath; upper leaflets 1–3 cm. long, 6–18 mm. wide, lower leaflets somewhat smaller; petiole and rachis finely woolly pubescent and often bearing a few slender prickles; stipules entire or slightly glandular-serrate, the pair about 4–7 mm, wide, veiny, slightly woolly pubescent beneath; flowering shoots borne on old wood, flowers solitary or in clusters of 2–8, lower bracts leafy, upper much reduced, lanceolate; pedicel and hypanthium glabrous; sepals slightly broadened at the tip, simple, or the outer ones slightly lobed, about 1.5 cm. long, slightly pubescent and often a little glandular on the outside, finely cobwebby within; petals pink, flowers about 3 cm. wide; calyx persistent in fruit, erect or somewhat spreading; hip globose or nearly so, red, about 8 mm. in diameter, wall thin; achenes about 4 mm. long, light brown, borne on the bottom and sides of the hypanthium. (*Macoúnii*, named for the Canadian botanist, John Macoun.)

Common in the western part of the Minnesota Valley, and along the western border of the state. Minnesota to British Columbia, south to Nebraska, Texas, and Oregon.

2a. True *Rosa Woodsii* Lindl. differs from *R. Macounii* in having much stouter spines, smaller glabrous leaflets, and smaller flowers and fruit. It is a western species reaching its eastern limits in the Dakotas. A colony of this species has long been established along the tracks of the Belt Line Railway in the vicinity of Minneapolis, but it shows little or no tendency to spread. Collections from this colony are the only Minnesota specimens of this species in the University herbarium.

3. Rosa acicularis Lindl. Ros. Monog. 44. 1820.

PRICKLY WILD ROSE

R. Sayi Schwein. 1824.

Shrubs 3–10 dm. high; stems greenish or somewhat reddish, thickly beset with slender, straight prickles 3–6 mm. long, those by the nodes often longer and stouter than the others, but scarcely forming definite infrastipular spines; leaves with 5–7 leaflets, leaflets elliptical or ovate, short-stalked (about 1 mm.) or often entirely sessile, thin, apex commonly acute, sometimes rounded, base wedge-shaped, or more often rounded or cordate, margin rather coarsely serrate, the teeth pointed outward, convex on both sides, simple or more frequently glandular-serrulate, upper surface dull, glabrous, lower surface paler, somewhat silky and usually more or less resinous glandular; upper leaflets 2–5 cm. long, 1.5–2.5 cm. broad, lower

leaflets one-third to two-thirds as large; petiole and rachis glandular, with or without long silky hairs; stipules simple, usually widely dilated, a pair of stipules often 1.5 cm. broad, occasionally narrow, thin, veiny, glandular, and sometimes also woolly pubescent, the margin roughened by glands but usually otherwise entire; flowering shoots borne on the old wood, mostly less than 1 dm. long, flowers solitary or rarely in clusters of 2–3; pedicel and hypanthium glabrous or rarely glandular; sepals usually simple, somewhat broadened at the tip, 2–3 cm. long, glandular on the outside and sometimes finely pubescent within; petals bright pink, flower 5–7 cm. wide; calyx persistent in fruit, sepals erect; hip elongated, tapering at the base, or nearly globular, about 1.5 cm. in diameter, red and translucent; achenes thick, very light-colored, about 4 mm. long, borne at the base and on the sides of the hypanthium. (*Aciculáris*, furnished with needles, referring to the many needle-like prickles.)

A polymorphic, circumboreal species originally described from Siberia. The typical form has elongated pyriform hips, and leaflets with nearly simple serration. The amount of resinous glandular granulation on the under side of the leaflets varies considerably but is usually less abundant than in var. *Bourgeauiana*, and it is sometimes practically wanting. There seems to be no good reason for distinguishing the forms with resinous glandular leaflets as a variety (var. *Sayiana* Erlanson) as they occur throughout the range of the species, in Siberia as well as in America, and in this character a completely graded series connects the eglandular forms, with the strongly glandular type seen in var. *Bourgeauiana*.

In Minnesota, common in the northern and northeastern parts of the state, chiefly in the region of the evergreen forests. Anticosti to Alaska, south to Vermont, the region of the Great Lakes, and Colorado, also Asia and Europe. In Siberia growing within 300 miles of the Arctic Ocean. Flowers in May and June, somewhat earlier than *R. blanda*.

Forms apparently intermediate between this rose and *R. arkansana* occur in the northern Red River Valley, they are very possibly of hybrid origin.

Several American varieties of this species have been described, of which the following are known to occur in Minnesota.

3a. R. acicularis Lindl. var. **Bourgeauiana.** Crepin, Bull. Soc. Bot. Belg. 15: 30. 1876.

R. Bourgeauiana Crepin.

Fruit globular, leaflets soft pubescent and rather strongly resinous glandular beneath, doubly serrate with minute glandular serrulations.

In Minnesota, with the same range as the species, and apparently more abundant, at least northward. Ontario to Mackenzie, south to Michigan, Minnesota, and in the mountains to Colorado.

3b. R. acicularis Lindl. var. **rotunda** Erlanson, Papers of the Mich. Acad. of Sci. Arts and Let. 5: 84. 1925.

Fruit globular as in var. *Bourgeauiana*, but with the leaflets of typical *R. acicularis*. (*Rotúnda*, round.)

In Minnesota, with the same range as the species. General range undetermined, originally described from Michigan.

4. Rosa blanda Ait. Hort. Kew. 2: 202. 1789.

SMOOTH WILD ROSE

Much branched shrub 2–12 dm. high, spreading widely by creeping rhizomes; woody twigs usually dark purplish red, first year's shoots from the rhizome usually covered with many weak bristle-like prickles, shoots on old wood with a few scattered prickles, or often entirely glabrous; leaves with 5–7 leaflets, very rarely with more; leaflets ovate to lanceolate, usually with stalks about 1 mm. long, apex rounded, obtuse, or acute, base wedge-shaped, margin sharply and usually simply serrate down to the middle or a little lower, upper surface dull green, somewhat puberulent or nearly glabrous, lower surface finely pubescent, rarely glabrous, the midrib prominent and ridged, the principal veins distinct but scarcely ridged; upper leaflets 2–4 cm. long, 1–2 cm. wide, lower leaflets one-half or two-thirds as large; petiole and rachis with fine woolly pubescence, very rarely glandular; stipules simple, entire or with the free auricles finely serrate, thin, veiny, usually glabrous except along the margin, wide expanded, especially those of the upper leaves, the pair often 1 cm. wide; flowering shoots borne on the old wood, flowers solitary or in loose clusters of 2–8, bracts of the inflorescence leaf-like, or with the blade reduced or lacking and the stipules forming broad, round-ovate bracts; pedicel of flower and hypanthium glabrous, sepals usually simple, slightly broadened at the tip, 1.5–2 cm. long, glandular on the outside, or rarely glabrous, finely woolly pubescent within; petals bright pink or sometimes pale, flower 3.5 cm. broad; calyx persistent, in fruit more or less erect; fruit scarlet, opaque, round or somewhat elongated; achenes slender about 4 mm. long, light brown. (*Blánda*, smooth.)

Copses, edge of woods, and prairies throughout the state, most abundant in the region of hardwood forests. Anticosti to Manitoba, south to Pennsylvania and Missouri.

In the latitude of Minneapolis *R. blanda* blooms in late May and June, and is the earliest of the wild roses; northward it is preceded somewhat by *R. acicularis*.

Several varieties of this rose occur in Minnesota. The typical form has pubescent leaflets, with simple serration, and very few prickles except on young shoots from the rhizome. Forms with more prickles on the branches have been described as var. *hispida* Farwell and var. *subgeminata* Schuette, the latter with prickles tending to occur more or less in pairs at the nodes. The following have sometimes been considered as species.

4a. R. blanda Ait. var. **glabra** Crepin, Bull. Soc. Belg. 15: 33. 1876.

R. subblanda Rydb.

Leaflets and stipules glabrous on both sides, rachis and petiole glabrous or with a few scattered hairs. (*Glábra*, glabrous.)

All the specimens seen are from the southern third of the state. New Hampshire to Manitoba, south to Michigan and Iowa.

Some plants agreeing otherwise with this variety have the hypanthium with scattered prickles, some of them gland-tipped. It has been suggested that these may be hybrids with *R. humilis*, but their distribution in Minnesota does not indicate this, as the latter rose barely enters the eastern border of the state, and the form just mentioned occurs as far west as the upper Minnesota Valley.

4b. R. blanda Ait. var. **acicularioides** (Schuette) comb. nov.

R. acicularioides Schuette, Proc. Am. Assoc. Adv. Sci. 46: 279. 1898.

Stipules, petiole, and rachis puberulent and glandular, leaflets glandular, doubly serrate, pubescent but scarcely at all glandular beneath; stem relatively prickly. (*Acicularioides*, resembling *R. acicularis*.)

In Minnesota, chiefly in the Minnesota Valley, particularly in the eastern part within 30 miles of Minneapolis, where it is quite abundant. Michigan, Wisconsin, and Minnesota.

While the glandular rachis and double serration of the leaflets are somewhat suggestive of *R. acicularis*, the distribution of this rose in Minnesota indicates that it has no connection with that species. It is certainly very closely allied to *R. blanda*, and seems best regarded as a variety of that species.

5. Rosa arkansana Porter, Porter & Coulter, Syn. Fl. Colo. 38. 1874.

PRAIRIE WILD ROSE

R. polyanthema Lunnell.

Low shrub about 3–5 dm. high, rarely taller, sometimes almost herbaceous from the widespreading woody rhizome; woody twigs reddish green, rarely dull purplish red, twigs usually covered with fine bristle-like prickles about 3 mm. long, the prickles sometimes larger in the vicinity of the nodes but not forming distinct pairs of infrastipular prickles; leaves with 7–11, mostly 9, leaflets; leaflets broadly obovate or oblanceolate with stalks about 1 mm. long or sessile, thick, apex occasionally rounded but usually broadly or acutely wedge-shaped, base rounded or wedge-shaped, margin sharply and usually simply serrate down to the middle or a little below, upper surface dull green, nearly glabrous, lower surface scarcely paler, finely woolly pubescent, rarely nearly or quite glabrous, the midrib and principal veins prominently ridged; upper leaflets 2–4 cm. long, 1.2–2.5 cm. wide, lower leaflets smaller; petiole and rachis with fine woolly pubescence, sometimes with a few stalked glands or nonglandular prickles; stipules simple, entire or serrate, rather narrow, the pair of stipules rarely exceeding 8 mm. in breadth, widest in the region of the sharply acute auricles, thick, finely woolly pubescent or nearly glabrous, usually glandular along the margin and frequently also on the lower side, veins obscure except for a prominent vein in each auricle; flowering shoots borne on the old wood, or often arising

directly from the rhizome, flowers usually in dense corymbs of 3–10 (sometimes as many as 30), bracts of the inflorescence lanceolate, acute; pedicel and hypanthium glabrous; sepals usually simple, more or less broadened at the tip, 2–2.5 cm. long, glabrous or glandular pubescent on the outside, densely fine woolly pubescent within; petals bright pink, often of a salmon tone, rarely nearly white; flower 4–6 cm. wide; calyx persistent in fruit, reflexed after anthesis, but finally more or less ascending; hip round or somewhat elongated, scarlet, opaque; achenes stout, light brown, about 5 mm. long, borne on the bottom and lower sides of the hypanthium. (*Arkansána*, Arkansan, the species being originally described from the valley of the Arkansas River in Colorado.)

Typical *Rosa arkansana* has the leaves entirely glabrous or with slightly pubescent petiole, rachis, and veins. It is far less common in Minnesota than the following variety, being most abundant in the southeastern part of the state. *R. polyanthema* Lunnell, described as differing in its tall habit, appears to have no taxonomic standing, even as a variety. Lunnell's specimens appear to be merely extraordinarily vigorous examples of typical *R. arkansana*. Similar specimens have been collected in southeastern Minnesota. Wisconsin and North Dakota, south to Kansas and Colorado.

5a. **R. arkansana** Porter var. **suffulta** (Greene) Cockerell, Bull. Torr. Bot. Club, 27: 88. 1900.

R. pratincola Greene.
R. suffulta Greene.

Petioles, rachis, and lower side of leaflets finely woolly pubescent. (*Suffúlta*, supported beneath.)

Very abundant throughout the prairie regions of Minnesota, less common in the wooded districts, and wanting in the northeast corner of the state. Illinois to Alberta, south to Texas and New Mexico.

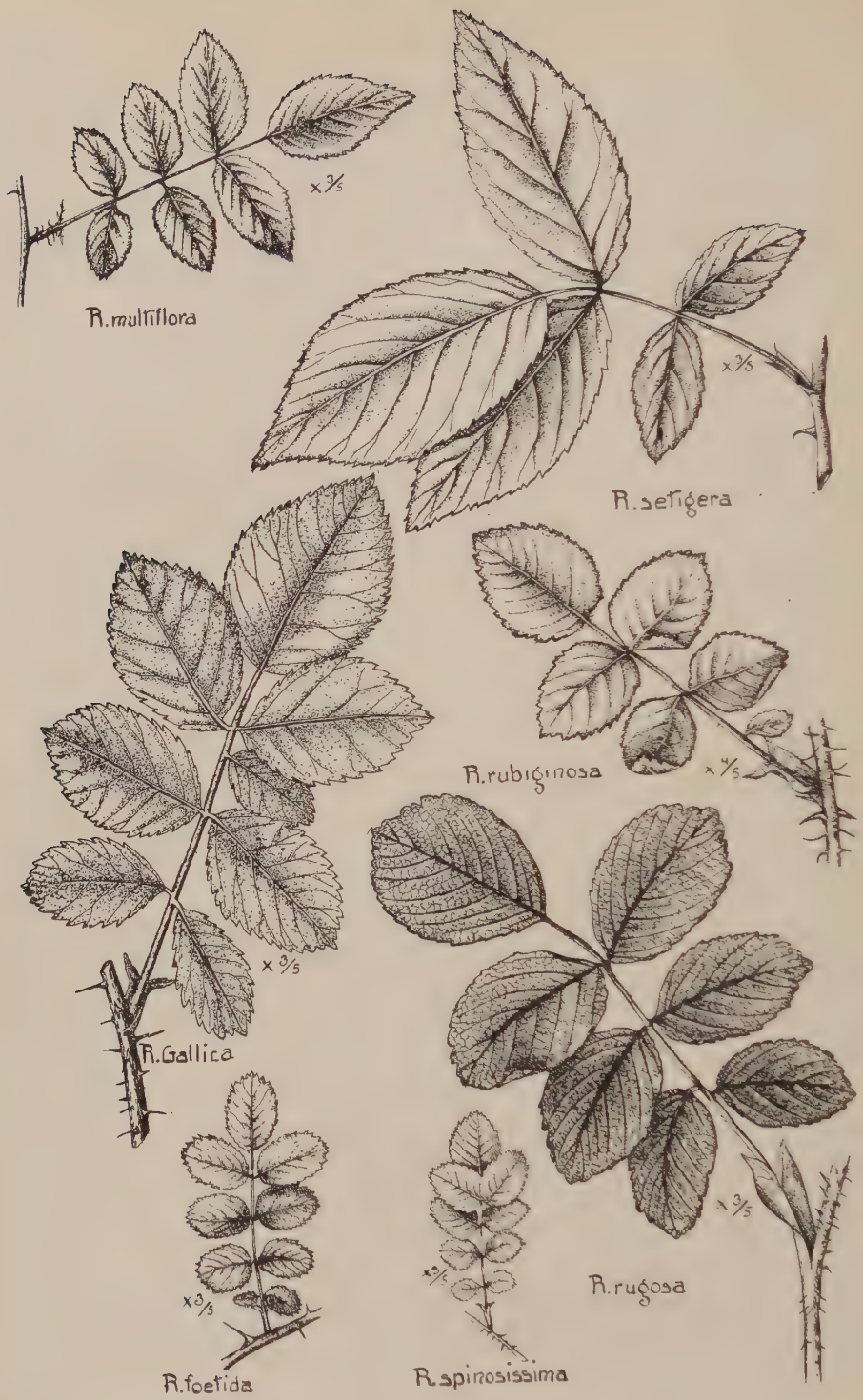
This is the common wild rose of the prairies, blooming about two weeks later than *R. blanda*, about June 15 in the latitude of the Twin Cities, and continuing to bloom throughout much of the summer. In unprotected situations it often kills nearly or quite to the ground during the winter, but this does not interfere with its free blooming the following summer.

5b. **R. arkansana** Porter var. **Bushii** (Rydberg) comb. nov.

R. Bushii Rydb. N. Am. Flora, 22: 506. 1919.

Differing from *R. arkansana* var. *suffulta* chiefly in the shape of the hip, which is pyriform with an acute base. Specimens with this form of hips occur in southeastern Minnesota. (*Búshii*, named for B. F. Bush, of Courtney, Missouri.)

The original description of this rose calls for a branched plant about 1 m. high. As above noted, habit in roses depends so much on conditions of growth that it is a very unsafe criterion of species.



CULTIVATED SPECIES OF ROSA

6. Rosa cinnamomea L. Sp. Pl. 491. 1753.

CINNAMON ROSE

Tall bush, 2 m. in height; stems reddish, armed with somewhat hooked, broad-based, infrastipular prickles about 5 mm. in length, often with other smaller scattering prickles; leaves with 5–7 leaflets; leaflets narrowly elliptical, finely, sharply, and simply serrate almost to the base, dull green and puberulent above, paler and soft pubescent below; upper leaflets 2–3.5 cm. long, 1.2–1.8 cm. wide, rachis and petiole soft pubescent and sometimes slightly glandular, stipules narrow or more or less widely dilated on flowering twigs, the pair sometimes 12 mm. wide, veiny, more or less pubescent and glandular; flowering shoots borne on the old wood, flowers usually solitary, fragrant; pedicel and hypanthium nearly glabrous; sepals up to 3 cm. long, woolly pubescent, enlarged at the tips, the outer usually with prominent lateral lobes; petals dull pink, flower about 4 cm. wide; sepals persistent and erect in fruit; hips elongated, tapering upwards, 12–15 mm. long, red. (*Cinnamómea*, cinnamon-like, probably from the fragrance of the flowers.)

Native of northern Europe and northwestern Asia, closely related to our common wild roses. The double-flowered form, *R. cinnamomea* var. *foecundissisma* Koch. with flat, very double, pink flowers is often planted in old-fashioned gardens. It is perfectly hardy and sometimes persists for some time without cultivation and spreads by suckers.

7. Rosa rugosa Thunb. Flor. Jap. 213. 1784.

Shrub 6 dm. to 2 m. high; stems stout, grayish brown or black, pubescent, armed with many crowded bristles and strong, pubescent, needle-like prickles, infrastipular prickles not obvious; leaves with 5–9 leaflets; leaflets elliptical or ovate-lanceolate, finely blunt-serrate or crenate to the base, thick and firm, rugose, glossy and dark green above, paler and soft pubescent beneath, apex rounded or pointed, base cordate or rounded; upper leaflets 2.5–4 cm. long, 1.5–2.75 cm. wide, lower ones somewhat smaller, petioles soft pubescent and prickly, stipules dilated, finely crenate, the pair often 15 mm. wide; flowers in small clusters borne on all the shoots throughout the season; pedicels pubescent or prickly, hypanthium glabrous; sepals pubescent, pointed usually simple, 1.5–2 cm. long; petals deep rose or white; flower 6–8 cm. wide; sepals persistent in fruit, hip globular, scarlet, 2 cm. or more in diameter. (*Rugósa*, rugose, referring to the leaves.)

A very variable rose, native of Japan, Siberia, and eastern Europe, belonging to the same group as our common wild roses. The forms from Russia and Siberia are perfectly hardy in Minnesota without protection in winter. It is much planted in shrubberies and hedges and is valuable on account of its fine foliage, large flowers borne throughout the summer, and handsome scarlet fruit. Double-flowered forms are in cultivation and also several hybrids of this species with various garden roses. They are not all as hardy as the original species.

8. Rosa gallica L. Sp. Pl. 492. 1753.

ROSE

Low bush with stems 1 m. or less high, prickles unequal, scattered, slender, straight; leaves with 3–7 leaflets, leaflets thick, somewhat rugose, simply serrate, dull green and smooth above, paler, glabrous or somewhat pubescent beneath, tip usually rounded, base rounded; upper leaflets 1.5–4 cm. long, 1–3 cm. wide; petiole hairy and

somewhat glandular; stipules somewhat dilated, thin; flowers solitary or in small clusters; pedicel glandular, hypanthium somewhat prickly; sepals 2–3 cm. long, glandular, the outer ones with lateral lobes; petals red or pinkish; flower 5 cm. or more wide; sepals inflexed and finally deciduous in fruit, hip dark red, almost globose. (*Gállica*, French.)

Native of southwestern Europe, established in the eastern United States. This rose is the parent of many garden varieties, some of which, like the pale pink "blush rose," are the only large-flowered garden roses that are truly hardy in Minnesota. They bloom about June 15, in the latitude of Minneapolis.

9. Rosa centifolia L. Sp. Pl. 491. 1753.

CABBAGE ROSE

Bush 5–15 dm. high; stems green, prickles unequal, stout, hooked; leaves with 5–7 leaflets; leaflets thick, sharply serrate, nearly glabrous on both faces, tip usually pointed, base rounded; upper leaflets 4–5 cm. long, 2.5–3 cm. wide; petiole glandular; stipules somewhat dilated, glandular; flowers solitary or in small clusters, fragrant; pedicel glandular, hypanthium glabrous or somewhat prickly; sepals 2.5 cm. long, glandular, the tips expanded and leafy with many lateral lobes; petals very numerous, pink; flower 8 cm. wide; fruit seldom formed, subglobose, orange red. (*Centifólia*, hundred-leaved.)

The cabbage rose is a double pink rose of ancient and unknown origin, sometimes regarded as a variety of *Rosa gallica* L., sometimes as a distinct species. The type and the moss varieties of various colors are often grown as garden roses in Minnesota but are not quite hardy without protection. During severe winters the canes often kill back to the level of the snow unless covered with straw.

9a. R. centifolia L. f. muscosa Seringe, Mus. Helv. 1: 18. 1818.

MOSS ROSE

Whole plant more prickly and glandular. The glandular pubesence is particularly noticeable on the pedicels, receptacles, and large sepals. (*Muscósa*, mossy.)

10. Rosa rubiginosa L. Mantissa, 564. 1771.

SWEET BRIER

R. eglanteria L. 1753, in part.

Shrub 6 dm. to 2 m. high; stems greenish or brown, armed with stout, hooked infrastipular prickles, 6–12 mm. long, often also with similar scattering prickles; leaves with 5–7 leaflets, fragrant, leaflets broadly elliptical or obovate, sharply doubly serrate almost to the base, bright green, finely pubescent on the upper side, slightly paler and densely glandular pubescent below, tip broadly wedge-shaped or rounded, base usually rounded; upper leaflets 1–2 cm. long, 8–18 mm. wide, lower about one-half as large, rachis and petiole soft pubescent, glandular and prickly, stipules widely dilated, veiny, glandular along the margin and on the under side; flowering shoots borne on the old wood, flowers solitary or in few-flowered clusters, mostly with leafy bracts; pedicel and often hypanthium prickly and glandular; sepals 1.5–2 cm. long, very glandular, the outer ones with well-developed lateral lobes; petals pink, flower 2–3.5 cm. in diameter; sepals deciduous in fruit, hip obovate, scarlet, about 12–15 mm. in diameter. (*Rubiginósa*, rusty.)

Native of Europe, widely naturalized in the eastern United States and on the Pacific Coast. Occasionally planted for its fragrant foliage. It is hardy without protection in the vicinity of Minneapolis, but the longer canes are apt to kill back and it seldom flowers.

11. Rosa foetida Herm. Dis. Ros. 18. 1762.

AUSTRIAN BRIER

R. eglanteria of authors (L. 1753 in part).

Shrub 6–12 dm. high; stems dark reddish brown, armed with very numerous straight, strong, needle-like prickles, the longest about 1 cm. long; leaves with 5–7 leaflets, fragrant; leaflets oblong, doubly serrate, glabrous above, hairy and somewhat glandular beneath, tip usually broadly wedge-shaped, base rounded or wedge-shaped; upper leaflets about 1.5 cm. long, 1 cm. wide; petiole hairy and prickly; stipules glandular, small, narrow, with acute triangular auricles; flowering shoots borne on the old wood, flowers usually solitary; pedicel glabrous or prickly, hypanthium glabrous or hispid; sepals entire, glandular-pubescent; petals golden yellow or coppery, flower 4–5 cm. wide; fruit globose, nearly black. (*Foétida*, fetid, the fragrance being rather unpleasant.)

Eastern Europe and western Asia. Seldom cultivated in Minnesota except in the var. *Harisonii*, "Harison yellow rose," a semidouble form originated in New York City about a century ago, and probably a hybrid of this and the following species. It is the only yellow rose commonly grown in Minnesota, is perfectly hardy without protection, and blooms about June 1 in the latitude of Minneapolis. It ripens a large amount of seed, and it would not be surprising to find it growing spontaneously in the vicinity of old gardens.

There are many recent hybrids of *R. foetida*, several of them very fine garden roses. They are of varying degrees of hardiness depending upon their other parentage.

12. Rosa spinosissima L. Sp. Pl. 491. 1753.

SCOTCH ROSE

R. pimpinellifolia L. 1759.

Shrub 6–10 dm. high; branches grayish, armed with numerous bristles and strong, needle-like prickles; leaves with 7–11 leaflets; leaflets broadly elliptical, doubly or simply sharply serrate, glabrous and bright green above, similar or slightly glandular beneath, 8–18 mm. long, 5–15 mm. wide; stipules very small; flowering shoots borne on the old wood, flowers solitary, very fragrant; pedicel smooth or somewhat glandular; sepals entire, glabrous; petals white, or in some forms yellowish or pinkish, flower 3–4 cm. across; sepals persistent and erect in fruit; hip globular, black. (*Spinosissima*, most spiny.)

Native of northern Eurasia, from Iceland to China. In Minnesota cultivated chiefly in a semidouble white-flowered form. It is perfectly hardy, blooming in late May and early June.

13. Rosa Hugonis Hemsl. Bot. Mag. 131: t. 8004. 1905.

Shrub with arching canes 1–2 m. long, armed with stout prickles, the young growth also bristly; leaves with 5–11 small leaflets, leaflets obovate or elliptical, 1.5–2 cm. long, obtuse at apex, mostly rounded at base, finely serrate, glabrous; stipules

very narrow; flowers solitary on lateral shoots, 5–7 cm. in diameter, the pedicels glabrous; sepals acute, glabrous without; petals yellow; fruit spherical, scarlet, becoming very dark. (*Hugónis*, named in honor of its discoverer, Father Hugh.)

A species recently introduced from western China, which appears to be entirely hardy in Minnesota, and bids fair to become a popular ornamental shrub.

14. **Rosa setigera,** Michx. Fl. Bor. Am. 1: 295. 1803.

PRAIRIE ROSE

Vines with canes 2–6 m. long, armed with stout, hooked, infrastipular prickles 6–8 mm. long and about the same width at the base; leaves with three large leaflets, often with an additional much smaller basal pair; leaflets ovate, sharply doubly serrate to the base, glabrous, glossy, dark green above, paler and glabrous or soft pubescent beneath, tip acute, base rounded; upper leaflets 4–7 cm. long, 2.5–4 cm. wide; petiole and rachis prickly, glandular, stipules narrow with sharply acute auricles, the pair only about 3 mm. wide, entire except for a row of small glands along the margin; flowers borne in many flowered corymbs with narrow lanceolate bracts; pedicel, hypanthium and calyx glandular; sepals 1–1.7 cm. long, the outer ones usually with narrow linear lateral lobes; petals deep pink, changing to nearly white; styles long, cohering in a projecting column; flowers 3–5 cm. wide, nearly scentless; calyx deciduous after flowering, fruit globular, about 1 cm. in diameter, achenes pale, angular about 4 mm. long. (*Setígera*, prickle-bearing.)

Native of the eastern United States, from the Gulf states north to Nebraska, Wisconsin, and southern Ontario, not native of Minnesota. Cultivated occasionally in its typical form and in the double-flowered form "Prairie Queen." The canes winterkill in the vicinity of Minneapolis unless laid on the ground and given a light protection of straw. Flowers in July.

15. **Rosa multiflora** Thunb. var. **cathayensis** Rehder & Wilson, Plantae Wilsonianae, 2: 304. 1916.

RAMBLER ROSE

Vine with canes up to 3 m. in length, armed with stout, curved infrastipular prickles about 5 mm. long; leaves with 7–9 leaflets; leaflets lanceolate, simple and sharply serrate, bright green and glabrous above, paler and soft pubescent beneath, tip acute, wedge-shaped, base wedge-shaped; upper leaflets 2.5–3 cm. long, about 1.5 wide; rachis and petiole prickly and soft pubescent; stipules narrow, glandular, conspicuously and strongly fringed; flowers in many-flowered corymbs with lanceolate, fringed bracts; pedicel glandular, hypanthium nearly or quite glabrous; sepals 5–7 mm. long, glandular, the outer with narrow lateral lobes; petals pink or rose-colored; styles long and cohering in a column, flowers about 2 cm. wide, nearly scentless; sepals deciduous in fruit, fruit globose about 5 mm. in diameter, achenes pale, angular, about 3.5 mm. long. (*Multiflóra*, many flowered.)

Typical *R. multiflora* Thunb., a native of Japan, has white fragrant flowers. *R. multiflora* var. *cathayensis*, possibly a distinct species, from China, has the flowers pink or rose-colored and nearly scentless. The latter is frequently cultivated in Minnesota in the semidouble form known as "Crimson Rambler." The canes are not reliably hardy in Minnesota unless laid on the gound and covered with straw. A dwarf form of this rose is also commonly cultivated ("Baby Rambler").

GARDEN ROSES

The large-flowered garden roses are mainly varieties of *R. gallica*, *R. centifolia*, and *R. damascena* (the damask rose of southwestern Asia), and hybrids of these with other species. Two very important stocks are the everblooming but tender *R. chinensis* Jacq. (Bengal rose), and *R. odorata* Sweet (tea rose), native of China, the parents of most of our hothouse roses. Many of the garden roses have most complicated pedigrees, the above-mentioned species being crossed and recrossed with one another, and with yet other species.

The hardiest garden roses are the varieties of *R. gallica* and *R. centifolia*, but they flower but once a year. Next in hardiness come the so-called "hybrid perpetual" roses. Their pedigree is probably (*R. gallica* × *R. chinensis*) × *R. damascena*, etc., but without any strain of *R. odorata*. They have a very abundant bloom in June, and continue to give occasional flowers throughout the season. They are reliably hardy in Minnesota if well covered with straw, and thatched with tar paper or some similar material to keep the straw from becoming damp and mouldy. The "hybrid tea" roses, which have as a basis *R. gallica* × *R. chinensis* × *R. odorata*, are the most continuous bloomers, but many of them are not reliably hardy, even when well covered.

The so-called hardy climbing roses are nearly all hybrids of *R. multiflora* var. *cathayensis*, *R. setigera*, or *R. wichuraiana*. None of them are reliably hardy in Minnesota unless they are laid on the ground and well covered with straw.

8. CHAENOMÉLES Lindl. Trans. Linn. Soc. 13: 97. 1822.

Thorny shrubs, with conspicuous flowers appearing mostly before the leaves; leaves simple, with conspicuous persistent stipules; flowers nearly sessile, single or in small clusters, from lateral winter-buds; hypanthium and calyx colored, sepals 5, deciduous in fruit; petals 5; stamens many; carpels 5, the ovaries united and buried in the hypanthium; styles united at the base; fruit a closed pome, with 5 many-seeded locules.

A genus of two or three species of eastern Asia. Closely related to *Cydonia*, the common quince, which, however, has solitary flowers borne on leafy shoots, sepals persistent in fruit, styles free to the base, and the pome open at the center. The following species is cultivated in Minnesota.

1. Chaenomeles Maulei (Mast.) C. K. Schneider, Ill. Handb. Laubholzk. 1: 731. 1906.

JAPANESE QUINCE

Pyrus japonica Thunb. (?) 1784.
Cydonia japonica Pers.

Small, more or less spiny shrub, 1–2 m. high; leaves ovate, serrate, glossy above, 3.5–7.5 cm. long; flowers on the old twigs in 2–6-flowered clusters, appearing before or with the leaves, typically scarlet-red, 3.5–5 cm. wide, sometimes only staminate; fruit globular or ovoid, 3.5–5 cm. in diameter, yellowish green, fragrant. (*Maulei*, named for the Messrs. Maule of Bristol, England, who first introduced this shrub to European gardens.)

Native of Japan. Used as an ornamental shrub in parks and gardens. Adapted for borders or shrubberies, and low ornamental hedges. Flowers in April and May.

9. ARONIA Pers. Syn. 2: 39. 1807.

CHOKEBERRY

Low, deciduous, thornless shrubs, with alternate, simple, finely crenate-serrate leaves, glandular along the midrib on the upper side; stipules small and caducous; flowers in compound cymes, white or tinted with rose, appearing with the leaves; hypanthium low, urn-shaped; sepals 5, persistent on top of the fruit; petals 5, spreading; stamens many; carpels usually 5, styles as many, united at the base; fruit a small, globose, berry-like pome, with as many cells as styles, red, purplish, or black. (*Arónia*, formed from *Aria*, the beam tree.)

A North American genus consisting of two or three species scarcely separable from *Sorbus*. This and the two following genera are frequently united with the genus *Pyrus*, the pear.

1. Leaves persistently gray tomentose beneath, pedicels, hypanthium, and sepals tomentose, fruit red ..... 1. *A. arbutifolia*
2. Leaves glabrous from the first or pubescent only when young, pedicels, hypanthium, and sepals glabrous or only loosely pubescent, fruit black ..... 2. *A. melanocarpa*

1. Aronia arbutifolia (L.) Ell. Bot. S. C. and Ga. 1: 556. 1821.

RED CHOKEBERRY

A branching shrub, mostly 1–2 m. high; young twigs gray tomentose, older twigs glabrous, gray to reddish brown; leaves elliptical to narrowly obovate or oblanceolate, 4–8 cm. long, 1.5–4 cm. wide, gradually narrowed at the base, acute or short acuminate at the apex, finely crenate-serrate, the teeth with dark, incurved, mucronate tips, dark green and glabrous or glabrate above, usually with dark, hair-like glands along the midvein, persistently gray tomentose beneath; petiole 4–10 mm. long; cymes compound, peduncles and pedicels gray canescent; flowers white or pinkish, 8–12 mm. in diameter; hypanthium and sepals densely tomentose; petals obovate, 4–5 mm. long, spreading; stamens nearly erect, slightly shorter than the petals; pedicels 5–8 mm. long, becoming somewhat longer in fruit; fruit globose, 6–8 mm. in diameter, red. (*Arbutifólia*, having leaves like *Arbutus*.)

In swamps and low woods, New York to Ontario, south to Florida and Arkansas. Not native to Minnesota, but occasionally planted. Foliage turning red in autumn.

2. Aronia melanocarpa (Michx.) Spach. Hist. Veg. 2: 90. 1834.

BLACK CHOKEBERRY

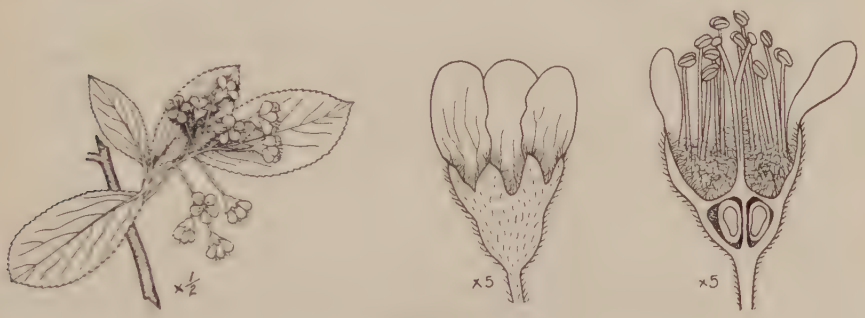
Aronia nigra (Willd.) Britton, 1894. Minn. T. and S. 1912.

A branching shrub 1–1.5 m. high; bark smooth, brown to grayish; leaves obovate to oblanceolate or sometimes elliptic, 2–7 cm. long, 1–2.7 cm. wide, narrowed at the base, acute or abruptly short acuminate to mucronate at the apex, finely crenate-serrate, the teeth incurved, mucronate-tipped, dark green and somewhat shining above, glabrous but with dark, hair-like

glands along the midrib, paler beneath, more or less tomentose-pubescent when young, becoming quite glabrous with age; petiole 3–6 mm. long; inflorescence 7–15-flowered; pedicels and peduncles more or less loosely pubescent or nearly glabrous, becoming entirely glabrous with age; flowers white, 10–12 mm. in diameter; hypanthium loosely pubescent or glabrous; sepals ovate to triangular, more or less woolly along the inner margins; petals ovate, 4–5 mm. long; stamens shorter than the petals; pedicels 5–12 mm. long; fruit globose 6–8 mm. in diameter, black or purplish. (*Melanocárpa*, dark-fruited.)

In swamps and low ground, rather common in the eastern part of the state from Olmsted County northward. Nova Scotia to western Ontario, south to Florida and Minnesota.

The species varies considerably in the degree of pubescence of the inflorescence, hypanthium, and sepals, but generally it becomes nearly or quite glabrous before the fruit is mature.



ARONIA MELANOCARPA

10. SORBUS L. Sp. Pl. 477. 1753.

MOUNTAIN ASH

Deciduous small trees or tall shrubs with large winter buds; leaves alternate, simple or more often odd-pinnately compound, sharply and sometimes doubly serrate; stipules deciduous; flowers white, numerous, showy, in terminal compound cymes; hypanthium urn-shaped; sepals 5, usually persistent on the fruit; petals 5, broad, with a short claw, spreading; stamens 15–20; carpels 2–5, inferior to half-inferior; styles 2–5 (usually 3), free or connate at the base; ovules 2 in each cell; fruit a 2–5-celled berry-like pome, 4–10-seeded. (*Sórbus*, the classical Latin name.)

A genus of about 100 species, natives of the north temperate zone.

1. Leaves regularly pinnately compound.
   a. Leaflets lanceolate, glabrous; flowers about 6 mm. in diameter; fruit 4–5 mm. in diameter 1. *S. americana*.

b. Leaflets oblong to oblong-lanceolate, more or less pubescent; flowers and fruits larger.
   (1) Leaflets short acuminate, sparsely pubescent beneath, northern native tree
   2. *S. subvestita*
   (2) Leaflets merely acute, persistently tomentose beneath, cultivated, occasionally spontaneous
   3. *S. aucuparia*

2. Leaves irregularly pinnately lobed, sometimes with a few leaflets at the base
   4. *S. semipinnata*

SORBUS AMERICANA SORBUS SUBVESTITA
(Leaves $\times\frac{1}{2}$, fruits $\times\frac{2}{3}$)

1. Sorbus americana Marsh. Arb. Am. 145. 1785.

A shrub or small tree 4–9 m. high, with a spreading crown; bark smooth, gray, with irregular, plate-like scales; buds elongate-conical, 1–1.8 cm. long, gummy; young twigs glabrous or slightly pubescent, reddish brown, marked by numerous whitish, elongate-elliptical lenticels; leaves with 6–8 pairs of leaflets; leaflets lanceolate to oblong-lanceolate, 5–8 cm. long, 1–2.3 cm. wide, mostly rounded at the base, generally slightly inequilateral,

acuminate or taper-pointed at the apex, sharply serrate nearly to the base with slightly appressed, sharp-pointed teeth, frequently faintly doubly serrate, bright green above, paler beneath, at first sparingly pubescent but usually becoming entirely glabrous with age; rachis green or red, usually with several glands and with a few long hairs at the base of the leaflets, otherwise nearly glabrous in age; inflorescence 6–12 cm. in diameter, pedicels and peduncles essentially glabrous; flowers about 6 mm. in diameter; hypanthium broadly obconical; sepals broadly triangular, slightly glandular along the margin, glabrous; petals nearly orbicular; stamens 15–20, considerably shorter than the petals; fruit 4–5 mm. in diameter, bright red. (*Americána*, American.)

Common throughout the region of coniferous forest, most abundant northeastward. Labrador to Manitoba, south to northwestern New England, the Great Lakes region, and in the mountains to North Carolina. Blossoms in July, fruit ripe in late August.

2. Sorbus subvestita Greene, Pittonia, 4: 130. 1900.

S. sambucifolia of many authors including Minn. T. and S. 1912, not *Pyrus sambucifolia* C. & S.

A small to medium-sized tree 6–12 m. high; bark dark gray; buds narrowly conical, scales reddish brown, the 2–3 outer ones glabrous, the inner brownish tomentose; young twigs at first grayish tomentose, soon becoming glabrate and reddish brown, with scattered elliptical lenticels; leaves with mostly 6 to 7 pairs of leaflets (rarely 5 or 8); lateral leaflets oblong to elliptic-oblong, 5–6 cm. long, 1.8–2.5 cm. wide, the lowermost pair occasionally much smaller, base inequilateral, rounded or somewhat narrowed, apex short acuminate; terminal leaflet often broadly elliptic to obovate, generally very abruptly acuminate; margin sharply and mostly simply serrate from about the middle (rarely almost to the base), upper surface dull green and glabrous, lower surface much paler, minutely papillose and more or less persistently pubescent, especially along the midrib; rachis slightly pubescent throughout, with resinous glands and long hairs at the base of the leaflets; inflorescence rather dense, 8–15 cm. in diameter, loosely pubescent throughout; flowers about 1 cm. in diameter; hypanthium pubescent, broadly obconic at the base, its free portion saucer-shaped; sepals broadly triangular, sparingly ciliate and with a few glandular teeth; petals ovate to elliptic, spreading; stamens slightly shorter than the petals; styles 3–4, about 2 mm. long; top of the ovary woolly pubescent; fruit vermillion red, 8–10 mm. in diameter. (*Subvéstita*, somewhat hairy.)

Common in the region north of Lake Superior. Labrador to Western Ontario, south to central Maine and northern Minnesota. Blooms in late June and July, fruit ripe in August.

This species was long confused with the Asiatic *S. sambucifolia* (C. & S.) Roemer, which is entirely distinct; it has been treated more recently as conspecific with one or more shrubby species of the Rocky Mountain region—*S. dumosa* Greene and *S. scopulina* Greene.* Our plant appears to be amply distinct from the western species. In the region of Lake Superior it is a considerably larger tree than *S. americana*.

SORBUS AUCUPARIA

3. Sorbus Aucuparia L. Sp. Pl. 477. 1753.

MOUNTAIN ASH, ROWAN TREE

A small tree 6–10 m. high; bark grayish, smooth; buds conical, 10–12 mm. long, vinous red, more or less white tomentose; young twigs more or less white-pubescent, generally becoming glabrous, dull gray or reddish brown; leaflets mostly 6–7 pairs (rarely 4–8), oblong to elliptic-lanceolate, 4–6 cm. long, 1–1.8 cm. wide, rounded and somewhat inequilateral at the base, mostly acute at the apex, rather coarsely and mostly simply serrate almost to the base, dull green above, more or less pubescent at least when young, much paler beneath and permanently white tomentose; rachis white tomentose, glandular and pubescent at the base of the leaflets; inflorescence large, 10–18 cm. in diameter; peduncles and pedicels hoary pubescent; flowers 8–9 mm. in diameter; hypanthium flatly obconical, pubescent; sepals ovate-triangular, scarcely

* The name *S. sitchensis*, which has often been used for the plant of the northern Rocky Mountains, belongs to an entirely distinct species of the Pacific Coast and far western mountains.

glandular along the margin; petals nearly orbicular, slightly pubescent toward the base on the upper side; stamens about as long as the petals; styles 3–4, slender, about 1.5 mm. long; fruit about 9 mm. in diameter, scarlet. (*Aucupária*, bird-catching.)

A frequently planted tree, becoming naturalized, native of Europe. Blossoms in May and June, fruit ripe in August.

4. ×Sorbus semipinnata (Roth) Hedlund, Monogr. Gatt. Sorbus. 1901.

OAK-LEAVED MOUNTAIN ASH

S. Aucuparia×*aria.*

This hybrid between the European mountain ash and the simple-leaved European species, *S. aria*, is sometimes planted. It has leaves with a few decurrent leaflets at the base, followed by a deeply lobed middle portion, and a nearly unlobed apical region. In pubescence it closely resembles *S. Aucuparia*. The flowers are larger than in that species, with a much deeper hypanthium, and longer and narrower sepals. (*Semipinnáta*, partially pinnate.)

Several forms of this hybrid are described by European botanists. In this country they generally pass under the name *S. quercifolia.*

11. MALUS Mill. Gard. Dict. abr. ed. 4. 1754.

APPLE

Trees or shrubs, sometimes with more or less thorn-like spurs; leaves alternate, simple but sometimes more or less deeply lobed, serrate or dentate; stipules small, early deciduous; flowers in corymbs or umbel-like clusters, white or pink, showy, appearing with or before the leaves; hypanthium campanulate or urn-shaped; sepals 5; petals 5, obovate; stamens 15–20 or more; carpels 2–5, imbedded in the hypanthium, their inner portions becoming cartilaginous in fruit; styles as many as carpels, more or less united at the base; ovary 2–5-celled; ovules 2 in each cell; fruit a pome. (*Málus*, classical Latin name for the apple tree.)

A genus of the north temperate zone embracing about 15 species, 7 of which are native in North America. It is frequently united with the closely related genus *Pyrus*, the pear, from which it differs chiefly in its cartilaginous carpels, and in the absence of grit cells in the flesh of the pome.

1. Lower surface of the leaves and outer surface of the sepals persistently tomentose; sepals persistent in fruit.
   a. Leaves closely crenate-serrate, abruptly short acuminate; sepals reflexed — 1. *M. pumila*
   b. Leaves, obtuse or short-acute, irregularly toothed, notched, or lobed; calyx lobes erect or spreading.
      (1) Some of the leaves more or less prominently notched or lobed towards the base; sepals mostly erect; fruiting pedicels slender, generally over 2.5 cm. long, fruit green.
         x. Flowers single, native — 2. *M. ioensis*
         y. Flowers double, cultivated — 2a. *M. ioensis* f. *plena*

(2) Leaves mostly only coarsely toothed; sepals spreading; fruiting pedicels stout, less than 2.5 cm. long, fruit yellow 3. ×*M. Soulardi*

2. Lower surface of leaves glabrous or pubescent only when young, hypanthium and outer surface of sepals glabrous or somewhat pubescent but not tomentose, sepals deciduous before fruit is ripe (except No. 6).

a. Leaves with crenate-serrate or entire margins, rolled up (convolute) in bud, pedicels glabrous.

(1) Leaf margin closely serrate or entire; sepals triangular-ovate, obtuse; midvein, petioles, and fruit pedicels purplish, flowers deep rose, double 4. *M. Halliana* f. *Parkmanii*

(2) Leaf margin incurved or callus-serrate; sepals narrowly lanceolate, fruit pedicels green, flowers white.

x. Ripe fruit about 1 cm. in diameter yellowish; sepals deciduous 5. *M. baccata*

y. Ripe fruit 2.5–3.5 cm. in diameter, bright red; sepals persistent 6. *M. prunifolia*

b. Leaves with sharply serrate margins, folded lengthwise (conduplicate) in bud; pedicels somewhat pubescent; flowers rose red 7. *M. floribunda*

MALUS BACCATA MALUS PUMILA MALUS IOENSIS

1. Malus pumila Mill. Gard. Dict. ed. 8. no. 3. 1768.

APPLE

Pyrus Malus L. Sp. Pl. 479. 1753. in part.
Malus Malus Britton.
M. sylvestris of authors (including Minn. T. and S. 1912), not of Miller.

A round-topped tree with spreading branches, sometimes attaining a height of 8 m.; bark of trunk rough and dark gray; young twigs pubescent, becoming glabrous and dark brown the second year; leaves broadly elliptical, oblong-ovate, or broadly ovate, 5–10 cm. long, 4–6 cm. wide, mostly rounded or subcordate at the base, sometimes abruptly narrowed, acute or short acuminate at the apex, somewhat irregularly crenate-serrate, becoming glabrate and more or less glossy above, paler beneath and

persistently tomentose; petiole 2–5 cm. long, tomentose; flowers in umbel-like corymbs, appearing with, or just before the leaves, white, pink or rose, 3.5–5 cm. in diameter; pedicels stout, densely tomentose, 1–2.5 cm. long; hypanthium campanulate, tomentose; sepals lanceolate, densely tomentose on both surfaces, reflexed in anthesis; styles mostly glabrous; fruit variable in size and shape, mostly globular to oblate, depressed at both ends, calyx persistent. (*Púmila*, small.)

A common fruit tree, much cultivated, and occasionally escaping from cultivation; a native of Europe and western Asia, cultivated since ancient times. Numerous horticultural races and varieties have been developed within this species, and some as a result of hybridization with other species. Only the hardiest of these varieties can be generally grown in Minnesota. This species has been confused with *M. sylvestris*, the wild crab of western Europe. The two species are generally regarded as distinct by competent European botanists. Flowers in May, fruit ripe from August to October.

2. Malus ioensis (Wood) Britton in Britt. & Brown, Ill. Fl. ed. 1. 2:235. 1897.

WILD CRAB, IOWA CRAB

Pyrus coronaria var. *ioensis* Wood, 1860.
P. ioensis Carruth, 1877.

A small tree 5–9 m. high, spurs frequently thorn-like, young twigs gray tomentose, in the second year generally becoming glabrous and purplish brown through exfoliation of the gray epidermal layers; leaves ovate to oblong, 3–6.5 cm. long, 1.5–4 cm. wide, irregularly crenate-serrate and frequently more or less pinnately lobed, especially towards the base, rounded or narrowed at the base, obtuse or wide-acute at the apex, dark green and sparsely pubescent or glabrate above, much paler and tomentose beneath; petiole 1–2 cm. long tomentose; flowers rose tinted in 2–4-flowered corymbs; pedicels slender, tomentose, 2–3 cm. long; hypanthium turbinate, densely tomentose; sepals about as long as the hypanthium, narrowly lanceolate, tomentose, mostly erect or slightly spreading; fruit short oblong or subglobose, on pedicels 2.5–4 cm. long, dull green and with a greasy feeling, about 2.5 cm. long; sepals persistent. (*Ioénsis*, named from the original locality, Iowa.)

Along edges of woods and thickets, common in the southeastern part of the state as far as the Minnesota River Valley, rare and local northward to Elk River. Wisconsin and Minnesota, south to Kansas and Oklahoma. Flowers in late May and early June, fruit ripe in September and October.

2a. M. ioensis f. plena Rehder.

BECHTEL'S DOUBLE-FLOWERING CRAB

A form with double flowers, 4–7 cm. in diameter; grading from pink to white in color; hypanthium generally larger and pedicels stouter and longer than in the species (sometimes up to 7 cm. long); styles frequently 8–12; in leaf and other vegetative characters identical with the species.

A handsome small tree, entirely hardy and very desirable as an ornamental—a spontaneous variation, originally discovered in the wild state in Illinois.

3. ×**Malus Soulardi** (Bailey) Britton in Britt. & Brown, Ill. Fl. ed. 1. 2: 235. 1897.

SOULARD'S CRAB

M. ioensis × *pumila.*

A natural hybrid between the two preceding species and resembling them in general habit; leaves ovate, elliptic or obovate, obtuse or truncate at the base, acute or rounded at the apex, irregularly crenate-dentate, or slightly lobed, densely tomentose beneath; flowers in rather dense corymbs, somewhat tinted; sepals spreading, tomentose, fruiting pedicels stout, less than 2.5 cm. long; fruit yellow, 4–7 cm. in diameter. (*Soulárdi*, named for James G. Soulard of Galena, Illinois.)

Infrequent in the southeastern corner of the state. Minnesota southward to Texas.

4. **Malus Halliana** Koehne f. **Parkmanii** (Temple) Rehder, Plantae Wilsonianae, 2: 286. 1916.

Pyrus Halliana Voss. 1896.

A shrub or small tree 2.5–3.5 m. high, with somewhat open crown; young twigs brownish red, soon becoming glabrous; leaves long-ovate or oblong, 5–7 cm. long, 2.5–4.5 cm. wide, narrowed at base, acute or acuminate at the apex, at first sparsely pubescent, but soon entirely glabrous, margin very closely crenate-serrate or sometimes entire, firm in texture, dark green and glossy above, paler beneath, petiole and midrib purplish; flowers deep rose, 2.5–3.5 cm. in diameter, double; calyx purple, sepals erect, triangular-ovate, pubescent on the inside; pedicels purple, about 3 cm. long. (*Parkmánii*, named for Francis Parkman, the historian, who early grew the double-flowered form.)

Schneider (Laubholzk. 1:720) is inclined to regard *M. Halliana* as a horticultural form of Japanese origin (perhaps a mutation) to be maintained provisionally as a species until further light on its origin is obtained.

5. **Malus baccata** (L.) Borkh. Handb. Forstb. 2: 1280. 1803.

SIBERIAN CRAB

Pyrus baccata L. 1767.

A small wide-topped tree 6–10 m. high, with spreading or ascending branches; young twigs generally glabrous from the first, one-year-old twigs purplish brown; leaves elliptic or ovate to ovate-lanceolate, 3–8 cm. long, 1.5–4 cm. wide, narrowed or somewhat rounded at the base, acuminate at the apex, closely crenate-serrate, rather thin, upper surface at first somewhat pubescent especially along the midrib and veins, soon becoming entirely glabrous and shining olive green, somewhat paler beneath and glabrous when mature; petiole slender 2–3 cm. long; flowers appearing with the leaves, white, 2.5–3.5 cm. wide, on green pedicels 5–7 cm. long; pedicels, hypanthium, and sepals at first sparingly pubescent, soon becoming glabrous, or sometimes glabrous from the beginning; fruit globose, about 1 cm. in diameter or occasionally larger, yellow or red, on long, slender pedicels; sepals deciduous. (*Baccáta*, having berries.)

Native of Siberia, Manchuria, and northern China and the Himalaya region. Extensively grown as an ornamental tree. Blossoms in May.

6. **Malus prunifolia** Borkh. Handb. Forstb. 2: 1278. 1803.

PLUM-LEAF CRAB

Pyrus prunifolia Willd. Phytogr. 1: 8. 1794.

A small tree with a rounded crown and spreading or somewhat ascending branches;

young twigs pubescent, reddish brown, leaves oval to obovate 4–8 cm. long, narrowed towards the base, acute or short acuminate at the apex, crenate-serrate, at first pubescent, soon becoming glabrous on both sides except along the midvein, firm in texture and shining above; flowers numerous, white, 2.5–3.5 cm. wide, on pubescent pedicels; fruit ovoid, 3–4 cm. long, 2.5–3.5 cm. in diameter, slightly depressed at the base, narrowed towards the apex, with protruding, persistent calyx, yellowish or bright red when ripe. (*Prunifólia*, plum-leaved.)

Native of China and probably of hybrid origin. A form of this species imported by Professor N. E. Hansen from Siberia in 1897 and known as the *Dolgo Crab* is being cultivated to a considerable extent in the middle Northwest both for ornamental purposes and for its fruit. It is said to be blight resistant and perfectly hardy far north in Canada.

7. **Malus floribunda** Sieb. ex Van Houtte, Fl. d. Serr. 15: 161. 1862–65.

FLOWERING CRAB

Pyrus pulcherrima Aschers. & Graebn. Syn. 6:71. 1906.

A shrub or sometimes a small tree up to 7 m. high, sometimes thorny; branches slender and often somewhat drooping, young twigs pubescent but soon becoming glabrous; leaves conduplicate in the bud, ovate to narrowly elliptic or oblong, 3–7 cm. long, 1.5–3 cm. wide, narrowed or rounded at the base, acuminate at the apex, margin sharply and simply or occasionally doubly serrate, upper surface dull green and glabrous, at first pubescent beneath but soon becoming glabrous, firm in texture; petiole up to 2.5 cm. long; flowers numerous, appearing with the leaves, rose or rose red, usually fading white, 2.5–3 cm. wide, on pubescent pedicels 2.5–3 cm. long; hypanthium and outer surface of sepals sparingly pubescent or glabrous, sepals oblong-lanceolate, longer than the hypanthium, densely tomentose within, not long persistent; styles usually 4, longer than the stamens; fruit subglobose, slightly depressed at the ends, 8–12 mm. in diameter, red or yellow. (*Floribúnda*, many-flowered.)

Frequently planted. Introduced from Japan and presumed to be of Chinese origin. This species is sometimes regarded as a hybrid between *M. baccata* and *M. Toringo*.

12. CRATAEGUS L. Sp. Pl. 475. 1753.

HAWTHORN, THORN APPLE

Thorny shrubs or small trees with alternate, simple, frequently lobed leaves; buds small, obtuse to hemispherical, with imbricated scales; flowers in corymbs, appearing with or after the leaves, usually white; hypanthium cup-shaped or campanulate, adnate to the carpels, sometimes with a free margin; epigynous disk covering the top of the ovary; sepals 5; petals 5, spreading, nearly orbicular, inserted on the margin of the disk; stamens 5–25, in 1 to 3 cycles; filaments broad at base, subulate; anthers oblong, white, yellow, or red; carpels 1–5, ovaries imbedded in the hypanthium but scarcely united; styles 1–5, free, persistent; stigmas terminal; fertile ovules 1 in each carpel; fruit a pome, the carpels forming 1-seeded stones or nutlets. (*Crataégus*, classical Greek name for the hawthorn.)

A large genus, widely distributed throughout the north temperate zone and in the tablelands of Mexico and the Andes.

The genus offers great taxonomic difficulties and it is impossible at present to say how many species it includes. About 1,000 species have been described from the United States alone, but it appears probable that many of these are hybrids or segregates of subspecific rank. No critical work has as yet been done on Minnesota *Crataegi* and for that reason it has been thought advisable to adhere to the broader concept of species in this work.

For the identification of species of Crataegus, and especially for their critical study, it is necessary to have material both in the flowering and ripe fruiting condition. Furthermore the color of the anthers is an important character and should always be noted. In Minnesota the various species blossom from the middle of May until about June 10, and the fruit ripens from the latter part of August through September.

1. Leaves deeply lobed; carpel and style 1; cultivated shrub with white or pink flowers 1. *C. monogyna*
2. Leaves with shallow lobes or nearly unlobed; carpels and styles 2–5; native shrubs or trees (except No. 2) with white flowers.
   a. Leaves broadest above or at the middle, cuneate at the base.
      (1) Leaves broadest above the middle; sepals not glandular-margined.
         (a) Leaves shining, glabrous, not impressed-veined above (cultivated) 2. *C. Crus-Galli*
         (b) Leaves dull, pubescent beneath, impressed-veined above 3. *C. punctata*
      (2) Leaves broadest at the middle; sepals with marginal glands.
         (a) Leaves impressed-veined above; sepals serrate; nutlets with pits or cavities on the ventral faces.
            m. Sepals laciniate-serrate; nutlets deeply pitted.
               x. Leaves glabrate above, pubescent especially along the sides of the veins beneath; stamens mostly 10, filaments short and stout; fruit subglobose, mostly over 1 cm. in diameter 4. *C. succulenta*
               y. Leaves strigose above, becoming scabrate, tomentose beneath; stamens mostly 20, strongly exserted, filaments slender; fruit ellipsoid or pyriform mostly under 1 cm. in diameter 5. *C. Calpodendron*
            n. Sepals slightly serrate, nutlets with shallow pits 6. *C. pertomentosa*
         (b) Leaves not impressed-veined; sepals gland-margined but not serrate; nutlets without pits on the ventral faces 7. *C. rotundifolia*
   b. Leaves broadest below the middle, subcordate, truncate, rounded, or broadly cuneate at the base.
      (1) Leaves tomentose beneath; corymbs tomentose; mature fruit pubescent.
         m. Mature leaves coriaceous; teeth short and blunt; nutlets with shallow pits 6. *C. pertomentosa*
         n. Mature leaves membranaceous; teeth long and acuminate; nutlets without pits.
            x. Leaves especially on vegetative shoots broadly cuneate at the base, deepest lobing at or above the middle 8. *C. submollis*

y. Leaves especially on vegetative shoots mostly cordate at the base, deepest lobing toward the base . . . . . 9. *C. mollis*

(2) Leaves glabrous beneath or sparingly villous along the veins; corymbs glabrous or villous; mature fruit glabrous and often glaucous.

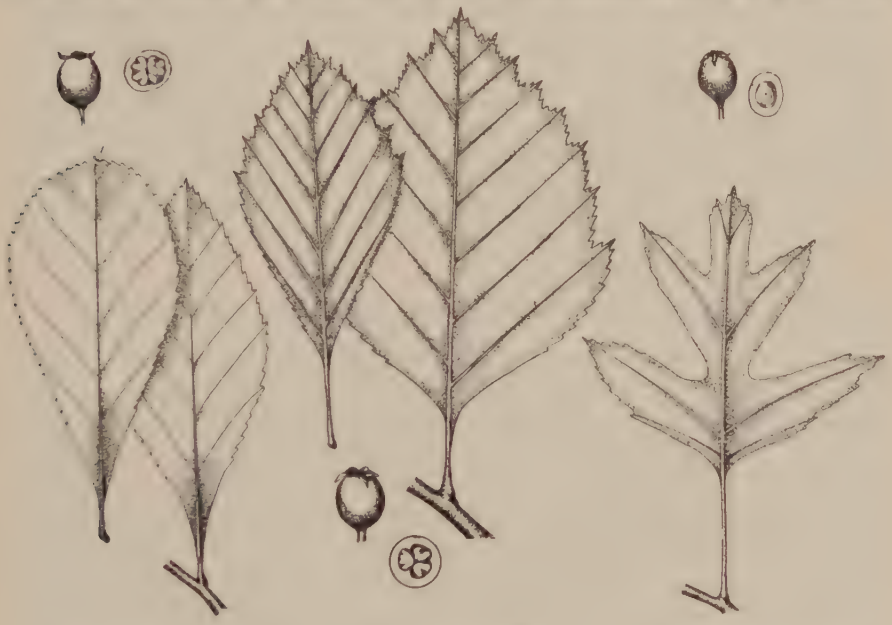
m. Average leaves 4–5 cm. long, conspicuously lobed; fruit 6–9 mm. in diameter, flesh firm . . . . . 10. *C. roanensis*

n. Average leaves 7–8 cm. long, inconspicuously lobed; fruit 10–18 mm. in diameter, flesh soft . . . . . 11. *C. macrosperma*

1. Crataegus monogyna Jacq. Fl. Aust. 3: 50. 1775.

ENGLISH HAWTHORN

A shrub or tree with ascending branches, with numerous thorns mostly about 1 cm. long, frequently with thorn-like short spurs up to 5 cm. long; young twigs reddish and glabrous, eventually becoming grayish black or dark reddish brown; leaves ovate, 2–5 cm. long, 1–6 cm. wide, deeply 3–7-lobed, the lobes entire or with a few teeth



CRATAEGUS CRUS-GALLI CRATAEGUS PUNCTATA CRATAEGUS MONOGYNA

toward the ends, leaves cuneate to truncate at the base, slightly pubescent along the veins when young, becoming glabrate and dark green above, somewhat paler beneath; petiole slender 1–2 cm. long, slightly wing-margined above, glabrous; corymbs glabrous, many-flowered; flowers white or pink, about 14 mm. in diameter; hypanthium obconic, glabrous or villous; sepals narrowly triangular, entire, obtuse or acute, strongly reflexed in anthesis; stamens about 20, filaments very slender; style 1, surrounded at the base by a ring of white hairs; fruit elliptic to subglobose, red, about 6 mm. in diameter; nutlet 1, ovoid, somewhat ridged. (*Monógyna*, one woman, referring to the single carpel.)

Occasionally planted as an ornamental shrub, native of Europe, North Africa, and western Asia. Double-flowered forms are sometimes planted.

This species has been frequently confused with *Crataegus oxyacantha* L., which differs in its less lobed leaves with finely serrate margins and in having two styles and nutlets. So far as known, *C. oxyacantha* is not planted in Minnesota.

2. Crataegus Crus-Galli L. Sp. Pl. 476. 1753.

COCK-SPUR THORN, NEWCASTLE THORN

A small tree, sometimes up to 8 m. high; bark of trunk dark brown, scaly; young twigs glabrous, yellowish brown, becoming glossy, older twigs grayish brown; spines straight or slightly curved, chestnut brown to ashy gray, 3–10 cm. long; leaves mostly obovate varying to oblanceolate and elliptic, 2.5–10 cm. long, 1–3 cm. wide, finely serrate above the middle with appressed, usually gland-tipped teeth, gradually narrowed to the base, rounded or more or less acute at the apex, dark green and shining above, paler and dull beneath, glabrous, coriaceous; petiole 5–10 m. long, wing-margined at least above; corymbs glabrous, many-flowered; flowers about 1.5–2 cm. in diameter; sepals narrowly lanceolate, entire, glandular-serrate or laciniate-toothed; stamens 10–20, anthers rose-colored; styles usually 2; fruit ellipsoid-ovoid to subglobose, about 1 cm. in diameter, greenish to red, flesh hard and dry; nutlets usually 2, rounded at the ends, inner surface flat, ridged on the back. (*Crus-Gálli*, cock-spur, in reference to the long thorns.)

Northern New York to southern Michigan and eastern Kansas south to Georgia. Occasionally planted in Minnesota.

3. Crataegus punctata Jacq. Hort. Vind. 1: 10, pl. 28. 1770.

A flat-topped tree up to 9 m. high, usually with horizontal or slightly ascending branches; bark of trunk rough, dark gray or brown; young twigs brownish, with gray pubescence, becoming glabrate and ashy or silvery gray the second year; spines usually few, slender, straight or slightly curved, gray, 3–10 cm. long; leaves obovate to rhombic-obovate, 4–8 cm. long, 2–4 cm. wide, sharply and doubly serrate above the middle and usually more or less incisely lobed, gradually narrowed toward the base, rounded to short acuminate at the apex, upper surface gray-green, impressed-veined, at first sparsely pubescent, becoming glabrate, lower surface somewhat paler and persistently villous especially along the veins; petiole 6–15 mm. long, margined above, pubescent; corymbs villous, many flowered; flowers 12–18 mm. in diameter; hypanthium narrowly obconic; sepals linear-lanceolate, with rather open sinuses between them, mostly entire or minutely glandular-serrate, villous on both surfaces; stamens 20, anthers yellowish or pink; disk deeply concave; styles 3–4; fruit short-oblong, truncate at the ends, dull red or bright yellow, light-dotted; nutlets 3–4, smooth on the inner faces, only slightly ridged on the back, 5–6 mm. long. (*Punctáta*, dotted, referring to the fruit.)

Very common through the southeastern part of the state as far north as Hennepin and Chisago counties and the region of the Big Woods. Quebec to Minnesota south to Pennsylvania, Kentucky, central Iowa, and in the mountains to northern Georgia.

4. Crataegus succulenta Schrader in Link, Handb. 3: 78. 1831.

C. macracantha Lodd. 1838.

A small tree, sometimes 10 m. high, with ascending branches; bark of trunk reddish brown, scaly; young twigs glabrous, yellowish green, becoming orange-brown and lustrous, in the second year becoming dark gray; spines numerous, straight or slightly curved, bright chestnut brown, shining, 4–8 cm. long; leaves broadly rhombic-ovate to obovate, 4–8 cm. long, 3–7 cm. wide, rather coarsely and doubly serrate, the teeth spreading; leaves with 4–6 short, acute or obtuse, often obscure, lobes above the middle, the lower half of the leaf unlobed, simply serrate to entire, gradually narrowed

CRATAEGUS SUCCULENTA CRATAEGUS CALPODENDRON

from about the middle, acute at the apex, coriaceous, dark shining green above, with strongly impressed veins, sparsely pubescent or glabrate, much paler beneath and pubescent especially along the veins, the pubescence forming a fringe of short stiff hairs on each side of the principal veins; petiole stout, 1–2 cm. long, winged above; corymbs sparingly villous, many-flowered; flowers about 16–20 mm. in diameter; hypanthium campanulate,

usually strongly villous; sepals lanceolate, acuminate, glandular-laciniate, villous; stamens 10–20, anthers pink or sometimes yellow; disk prominent; styles 2–3, surrounded at the base by a ring of pale hairs; fruit subglobose, 7–15 mm. in diameter, dark red, sparsely villous and pale dotted, pulp soft; nutlets 2–3, prominently ridged on the back, deeply pitted on the ventral surfaces, 6–8 mm. long. (*Succulénta*, referring to the soft character of the fruit.)

Very abundant in the southeast corner of the state and about the Twin Cities, less common northward to Chisago County and northwestward to Clearwater County. Nova Scotia to Minnesota, south to North Carolina and Nebraska.

5. Crataegus Calpodendron (Ehrh.) Medic. Gesch. Bot. 83. 1793.

C. tomentosa of authors including Minn. T. and S. 1912, not of L.

A shrub or small tree up to 6 m. high with ascending or spreading branches; bark smooth and pale gray to furrowed and dark brown; young twigs greenish, more or less tomentose, becoming orange-brown in the fall of the first year, later turning gray; spines usually few, nearly straight, 3–5 cm. long, generally ashy gray in color; leaves ovate, rhombic-ovate, to elliptic, 4–8 cm. long, 2.5–6 cm. wide, unlobed or often with several short lobes above the middle, gradually narrowed to the base or somewhat rounded, acute, acuminate, or sometimes rounded at the apex, sharply and irregularly doubly serrate, the teeth rather spreading, membranous to subcoriaceous, upper surface bright green with slightly impressed veins, sparingly pubescent, usually tending to become scabrous, lower surface paler, persistently somewhat woolly pubescent especially on the veins; petiole stout, about 1 cm. long, wing-margined almost to the base; corymbs white tomentose, many-flowered; flowers about 15 mm. in diameter; hypanthium narrowly obconic, tomentose; sepals narrowly lanceolate, glandular-laciniate, tomentose; stamens about 20, filaments slender and strongly exserted, anthers small, pink; disk concave; styles 2–3, slightly hairy at the base; fruit pyriform or ellipsoid, about 1 cm. long, orange-red or red, very persistent, its flesh glutinous; nutlets 2–3, short and broad, deeply pitted on the ventral faces, about 5 mm. long. (*Calpodéndron*, derivation of name obscure.)

Rather infrequent in the southeastern part of the state as far north as Minneapolis, possibly northwestward. Central New York to Minnesota, south to New Jersey, Missouri, and in the mountains to Georgia.

6. Crataegus pertomentosa Ashe, Journ. E. Mitch. Soc. 16: 70. 1900.

A small tree with nearly horizontal branches and a flattened crown; spines numerous, slightly curved, 2.5–8 cm. long; young twigs tomentose, becoming yellow-brown and glabrate by the end of the first season, older twigs brownish gray; leaves broadly ovate to obovate or oblong, 4–8 cm.

long, 3.5–7.5 cm. wide, finely and doubly serrate, with short and wide, minutely gland-tipped teeth; leaves with 4–5 pairs of short acute lobes, abruptly narrowed or almost truncate at the base, mostly acute at the apex, sparingly villous or glabrate above, tomentose beneath, especially along the veins, vivid dark green, subcoriaceous; petiole 2–3 cm. long, slightly winged above; corymbs many-flowered, tomentose; flowers 18–20 mm. in diameter; sepals lanceolate, deeply glandular-serrate; stamens 10–15; styles 2–4; disk deeply concave; top of the ovary tomentose; fruit depressed globose, 8–12 mm. in diameter, hard, red, villous; nutlets 2–4, thick, with shallow pits on the ventral faces, slightly grooved on the back, about 7 mm. long. (*Pertomentósa*, very tomentose.)

At present known in Minnesota only from the vicinity of Luverne in the extreme southwestern part of the state, where it occurs on quartzite ledges. Minnesota, Iowa, Kansas, and Missouri.

CRATAEGUS PERTOMENTOSA CRATAEGUS ROTUNDIFOLIA

7. **Crataegus rotundifolia** Borckh. in Roem. Arch. 1³: 87. 1798.

A round-topped shrub or tree, sometimes up to 7 m. high; bark of trunk reddish brown, scaly; spines numerous, deep chestnut brown, spotted with gray, slender, and more or less curved, 3–6 cm. long; young twigs yellowish green, more or less villous, becoming reddish brown by autumn and tending to become completely glabrate, marked by numerous nearly white lenticels; older twigs ashy gray or grayish brown; leaves elliptic or obovate, sometimes nearly orbicular, 3–6 cm. long, 2.5–5 cm. wide, finely and sharply

doubly serrate, with nearly straight gland-tipped teeth; leaves divided from slightly below the middle into 4–5 pairs of short, acute lobes, the lower lobes most prominent, cuneate at the base, rarely rounded, wide acute at the apex, thin, subcoriaceous, dark yellow-green and somewhat shining above with scarcely impressed veins, glabrous or slightly pubescent, somewhat paler beneath and glabrous, or villous especially along the veins; petiole 1.5–2.5 cm. long, slender, winged above, glandular and pubescent or glabrous; corymbs more or less villous, many-flowered; flowers 15–20 mm. in diameter; hypanthium narrowly campanulate, villous or glabrous; sepals narrowly lanceolate, glandular-margined, more or less villous on the inside, strongly reflexed at anthesis; stamens mostly 10, anthers small, pale yellow; disk flat; styles 3–4, surrounded at the base by a conspicuous tuft of hairs; fruit subglobose to elliptical, dark crimson, 7–10 mm. in diameter, sepals persistent; nutlets 3–4, rounded at the ends with a sharp keel on the ventral edge, about 6 mm. long. (*Rotundifólia*, round-leaved.)

Throughout the state, most common northward. Nova Scotia and New Brunswick to Saskatchewan, south to North Carolina, Nebraska, and in the mountains to New Mexico.

Most of the Minnesota material belongs to the var. *pubera* Sarg., which has pubescent twigs and foliage and strongly villous inflorescence. The nearly glabrous typical form occurs in Houston County.

8. Crataegus submollis Sarg. Bot. Gaz. 31: 7. 1901.

A tree up to 7 m. high with spreading branches forming a broad, symmetrical crown; spines numerous, slender, straight or slightly curved, chestnut brown, becoming gray; young twigs green, hoary tomentose, in late summer becoming orange-brown and somewhat glabrate, finally becoming glabrous, lustrous and orange or light red-brown; older twigs ashy gray; leaves ovate, 4–8 cm. long, 3.5–6.5 cm. wide, considerably larger on sterile shoots, coarsely and sharply doubly serrate, with straight acuminate teeth tipped with reddish glands; leaves with 3–4 pairs of acute lobes, mostly broadly cuneate at the base, rarely truncate or subcordate, acute at the apex, membranous, yellow-green, with scarcely impressed veins, upper surface with short, stiff, pale hairs, becoming scabrate, lower surface paler and soft pubescent with matted white hairs especially along the veins; petiole 1.5–3.5 cm. long, slightly winged above, almost terete below, tomentose, and with a few large glands; corymbs few to many-flowered, densely tomentose; flowers 18–24 mm. in diameter; hypanthium narrowly obconic, tomentose; sepals triangular-lanceolate, glandular-serrate, tomentose; stamens 10, with wide filaments and cream-colored anthers; disk flat and conspicuous; styles mostly 5, surrounded at the base with a tuft of long white hairs; fruit ellipsoid, orange-red, 12–18 mm. in diameter, marked with

large white dots, somewhat tomentose; nutlets mostly 5, strongly ridged on the back, sharply keeled on the ventral edge, 7–9 mm. long. (*Submóllis*, somewhat soft, referring to its similarity to *C. mollis*.)

The only Minnesota collections are from the vicinity of Minneapolis. The general range is cited as Quebec to Ontario, south to New York and Massachusetts, but the Minnesota specimens agree in all particulars with eastern collections.

CRATAEGUS SUBMOLLIS CRATAEGUS MOLLIS

9. Crataegus mollis (T. & G.) Scheele, Linnaea, 21: 569. 1848.

A tree sometimes up to 12 m. high with spreading branches, forming a broad-topped crown; spines few, mostly on the young growth, blackish brown, shining, nearly straight, 4–6 cm. long; young twigs yellowish green and villous, towards autumn turning dark yellow-brown and more or less glabrate with numerous pale and conspicuous lenticels, in age becoming gray with a yellowish tinge; leaves broadly ovate, 6–10 cm. long, 5–10 cm. wide, coarsely and generally doubly serrate, the teeth spreading, often broad at the base and acuminate; leaves with 4–5 pairs of short or moderately deep lobes, the basal lobes usually longer than the others, truncate to cordate at the base, mostly acute at the apex, dark yellow-green above with slightly impressed veins, at first pubescent with short, pale hairs, later becoming scabrate, somewhat paler below and persistently tomentose, particularly along th eveins; petioles 2–5 cm. long, stout, terete, tomentose,

and with a few stalked glands; corymbs tomentose, 4–15-flowered; flowers 2–2.5 cm. in diameter; hypanthium narrowly campanulate to obconic, tomentose; sepals with triangular base and acuminate tips, coarsely glandular-serrate, with bright red glands, tomentose on both sides; stamens 20, anthers pale yellow; disk somewhat concave; styles 4–5, surrounded at the base by a ring of stiff hairs; fruit ellipsoid to subglobose, 1.5–2.5 cm. in diameter (calyx very conspicuous on the half-grown fruit, usually deciduous before it is ripe), scarlet, flesh thick, yellow; nutlets 4–5, thin, rounded and obscurely ridged on the back, about 6 mm. long. (*Móllis*, soft, referring to the pubescence.)

Southern Minnesota, not extending as far north as the Twin Cities, most abundant in the southeastern corner of the state and the southern extremity of the Big Woods. Southern Ontario to South Dakota, south to Tennessee and Arkansas.

The far western *Crataegus Douglasii* Lindl. characterized by its black fruit, scarcely lobed obovate leaves, short pubescent above, glabrous beneath, and stout spines 1–2 cm. long, occurs at several points around Lake Superior. It is at present unknown in Minnesota but is to be looked for along the North Shore.

10. Crataegus roanensis Ashe, Bull. N. C. Agric. Coll. 175: 114. 1900.

S. fluviatilis Sarg.

A shrub or small tree up to 6 m. high, with ascending branches; bark of stem gray and smooth or slightly roughened below; spines numerous, slender, 2–6 cm. long, curved or the longer ones nearly straight, blackish brown, becoming grayish with age; young twigs bronze-green, glabrous, with minute lenticels, towards the end of the first summer becoming purple-brown, and in age greenish gray; leaves ovate or oblong-ovate, 3–6 cm. long, 2–5.5 cm. wide, the smaller sizes predominating, sharply doubly serrate throughout, the teeth acuminate, black glandular-tipped; leaves with 3–6 pairs of acute, straight lobes, broadly cuneate to subcordate at the base, acute at the apex, membranous, the veins not impressed, bronze-green when young, and sparsely short appressed pubescent above, becoming yellow-green and glabrate, lower side paler and glabrous from the beginning; petiole very slender, 1–3 cm. long, slightly winged above and glandular; corymbs rather loose, mostly 6–12-flowered, sparingly villous; flowers about 15 mm. in diameter; hypanthium narrowly turbinate to narrowly campanulate; sepals linear-lanceolate, rather broad at the base, margin entire or slightly glandular-toothed; stamens 5–20, filaments rather long and slender, anthers small, pink; disk deeply concave; styles 3–4, surrounded at the base by a small tuft of hairs; fruit ellipsoid or ovoid, 6–8 mm. in diameter, flesh firm; nutlets with flat faces and a sharp keel along the ventral edge, obscurely ridged on the back, 5–6 mm. long. (*Roanénsis*, from Roan Mountain, North Carolina.)

Known in Minnesota only from the vicinity of the Twin Cities and Taylor's Falls. Western Quebec to eastern Minnesota, south to Pennsylvania and in the mountains to North Carolina and Tennessee.

11. Crataegus macrosperma Ashe, Journ. E. Mitch. Soc. 16: 73. 1900.

A shrub or small tree up to 7 m. high, with ascending branches; spines numerous, curved, 2–5 cm. long, dark chestnut brown, soon becoming gray; young twigs bronze-green, glabrous, by the end of the first season dull reddish brown, with fairly well-marked lenticels, very soon turning gray or

CRATAEGUS ROANENSIS

CRATAEGUS MACROSPERMA

grayish brown; leaves elliptic-ovate to broadly ovate, 4–9 cm. long, 3–8 cm. wide, sharply doubly serrate, the teeth very spreading and acuminate; leaves with 4–6 pairs of short, broad, and often obscure acuminate lobes, broadly cuneate, rounded, truncate, or subcordate at the base, acute to short acuminate at the apex, membranous, the veins not impressed, bronze-green and sparingly pubescent above when young, becoming dark yellow-green and slightly scabrate in age, much paler, subglaucous, and glabrous beneath; petiole slender, 1–4 cm. long, scarcely winged, glandular; corymbs very loose, 5–15-flowered, glabrous or slightly villous; flowers 1.4–2 cm. in

diameter; hypanthium narrowly campanulate, mostly sparingly villous; sepals mostly longer than the hypanthium, linear from a triangular base, entire or with 1 or 2 irregular gland-tipped teeth, glabrous on the outside, sparingly pubescent on the inside; stamens 5–20 (usually 5–10), anthers small, pink; disk somewhat concave; styles 2–4, surrounded at the base by a small tuft of hairs; fruit ellipsoid or pyriform, scarlet to crimson, often glaucous, 10–18 mm. in diameter, flesh soft when ripe, calyx persistent; nutlets 2–4, thick, ridged on the back, flattened or with a short keel on the ventral surface, 7–8 mm. long. (*Macrospérma*, large-seeded, referring to the nutlets.)

Apparently infrequent, all the collections seen are from Houston and Hennepin counties. Nova Scotia and Maine, west to eastern Minnesota, south to North Carolina and Tennessee.

13. **COTONEASTER** Medic. Gesch. Bot. 85. 1793.

COTONEASTER

Shrubs, sometimes becoming tree-like, evergreen or deciduous, hardly ever thorny; leaves alternate, simple, entire, stipulate, short-petioled, mostly small and numerous; flowers white or pink, solitary or numerous, in cymose clusters terminating short, lateral, leafy shoots, appearing after the leaves are out; hypanthium campanulate, united with the ovary; sepals 5, small, persistent on the fruit; petals 5; stamens about 20; ovary inferior; fruit black or red, small, generally long persistent; stones 2–5. (*Cotonéaster*, L., quince-like, in reference to the leaves of some species.)

A genus of about 40 species of the temperate regions of the Old World, most numerous in eastern Asia. The following species appears to be the only one so far cultivated to any extent in the state.

1. **Cotoneaster lucida** Schlecht. Linnaea, 27: 541. 1854.

An upright bushy shrub, 1–2 m. high; young twigs strigose pubescent, becoming reddish brown and glabrate towards the end of the season, during the second year the outer epidermis exfoliating as a silvery gray layer, exposing the reddish brown bark; older twigs dark brown or grayish black; leaves thick and firm in texture, elliptic or ovate, 2–5 cm. long, 10–28 mm. wide, mostly narrowed at the base, broadly to narrowly acute at the apex, frequently mucronate, entire, dark green and shining above, at first pubescent but later becoming glabrous, paler beneath and pubescent; petiole 2–5 mm. long, pubescent; inflorescence terminating short, leafy, lateral shoots, 2–4-flowered, the peduncle strigose pubescent; flowers pink; hypanthium broadly campanulate, sparsely pubescent; sepals triangular, erect or slightly spreading, tomentose along the margins and at the tips; petals obovate, crenulate-margined; stamens about 20, shorter than the petals; fruit oblong, black when ripe, about 1 cm. long; stones 2–3, pubescent at the summit and marked with a transverse band. (*Lúcida*, shining, referring to the glossy foliage.)

Native of the Altai Mountains and the Lake Baikal region of central Asia. Frequently planted as an ornamental shrub and entirely hardy in our climate. In cultivation for a long time. Blossoms in June, fruit ripe in autumn and long persistent.

This shrub appears to be confused with the true Pekin Cotoneaster—*C. acutifolia* Turcz. or *C. acutifolia* var. *pekinensis* Koehne, which it closely resembles in habit as well as foliage and flowers, but which, according to C. K. Schneider (Handb. der Laubholzk. 1: 751), is rather infrequent in cultivation.

COTONEASTER LUCIDA

14. AMELANCHIER Medic. Phil. Bot. 1: 55. 1789.

JUNE-BERRY, SERVICE-BERRY, SASKATOON

Unarmed shrubs and small trees with alternate, simple, pinnately veined, serrate or dentate leaves, with small, early deciduous stipules; flowers white, in racemes or rarely solitary; hypanthium campanulate or saucer-shaped, adnate below to the ovary; sepals 5, persistent in fruit; petals 5, ovate to oblong or rarely linear; stamens numerous; petals and stamens inserted in the throat of the hypanthium; carpels 3–5, more or less united, ovary inferior or half-inferior, 3–5-celled with each cell nearly divided by a false partition, styles 3–5, united at the base and sometimes almost to the summit, pubescent below, stigmas 3–5; fruit a small berry-like pome, 6–10-celled, 6–10-seeded, generally sweet and edible. (*Amelánchier*, the Savoy name of the medlar.)

A genus of at least 25 closely related species natives of the north temperate zone.

1. Flowers racemose, leaves mostly rounded or cordate at the base, conduplicate in the bud; petioles mostly over 1 cm. long.

a. Leaves coarsely toothed; main lateral veins conspicuous, regular, parallel, and mostly straight, without short intermediate veins.
   (1) Some of the leaves acutely or obtusely angled at the apex.
      (a) Tall, straggling shrub not forming colonies; tomentum of leaves mostly shed before the flowers open 1. *A. sanguinea*
      (b) Low, stoloniferous shrub forming colonies; leaves very tomentose below at time of flowering 2. *A. humilis*
   (2) Leaves rounded or truncate or retuse at the apex; tomentum early deciduous 3. *A. florida*

b. Leaves finely serrate; main lateral veins curving upward and anastomosing toward the margin, irregularly spaced, usually with a number of short intermediate veins.
   (1) Tall, non-stoloniferous shrubs or small trees; leaves acute or short acuminate.
      (a) Leaves at time of flowering three-fourths grown, nearly glabrous or slightly silky, bronze-purple, mature leaves glabrous 4. *A. laevis*
      (b) Leaves scarcely unfolded at the time of flowering, covered with a white tomentum, green, mature leaves somewhat downy beneath 5. *A. canadensis*
   (2) Low, stoloniferous shrub; leaves rounded at the apex 6. *A. stolonifera*

2. Flowers solitary or in clusters of 2 or 3; leaves mostly acute or narrowed at the base, imbricated in the bud; petioles under 1 cm. long 7. *A. Bartramiana*

1. Amelanchier sanguinea (Pursh) DC., Prod. 2: 633. 1825.

A. rotundifolia Roemer [Britt. & Brown, Ill. Fl. ed. 1.]

A. spicata (Lam.) C. Koch [Gray's Man. ed. 7, and Minn. T. and S. 1912].

A straggling, slender shrub 1–2.5 m. high, the stems solitary or few in a clump but not stoloniferous nor forming colonies; leaves oval to oval-oblong, rarely nearly orbicular, rounded or subcordate at the base, mostly acutely or obtusely pointed at the apex, occasionally some of them rounded, 2–6 cm. long, 2.5–4 cm. wide; margin coarsely dentate-serrate nearly to the base, teeth sharp and spreading, 4–6 per cm.; young leaves yellowish tomentose below, tomentum soon becoming floculent and peeling off; mature leaves glabrous or occasionally with persistent traces of the tomentum; veins in average leaves 13–15 pairs, rather close together, straight, conspicuous, all of the upper running straight to the margin and ending in teeth; petiole 12–22 mm. long, persistently tomentose; flowers many, generally in drooping racemes, appearing when the leaves are nearly full grown; racemes 4–7 cm. long, lower pedicels 12–20 mm. long in flower; flowers large and showy; hypanthium open, saucer-shaped, 5 mm. in diameter; sepals oblong-lanceolate, about 2–4 mm. long, glabrous on the outside, tomentose within, spreading, becoming reflexed when the petals fall; petals linear to narrowly spatu-

late, 10–15 mm. long; young fruit strongly constricted below the hypanthium; mature fruit almost black, glaucous, very juicy and sweet. (*Sanguinea*, bloody, of somewhat doubtful application.)

Common in the northeastern corner of the state, occasional throughout the coniferous forest area and along the eastern margin of the state. Quebec to Minnesota, south to Massachusetts and New York. Blossoms in May, about the same time as lilacs, fruit ripens in late July and August.

AMELANCHIER

2. Amelanchier humilis Wiegand, Rhodora, 14: 141. 1912.

A. spicata of Am. authors in part, including Britt. & Brown, Ill. Flora.
A. oblongifolia (T. & G.) Roemer [Minn. T. and S. 1912].

A shrub 3–12 dm. high, stoloniferous and forming patches; leaves ovate, oblong, or rarely obovate, subcordate or rarely rounded at the base, obtusely angled at the apex, rarely subacute or subtruncate, 2.5–5 cm. long, 2–4 cm. broad, margin coarsely dentate-serrate to below the middle, teeth rather low, often double, abruptly short apiculate from a blunt summit, sinuses acute, 4–5 teeth per cm.; young leaves nearly glabrous above, densely tomentose beneath with a rather persistent yellowish white tomentum, mature leaves nearly glabrous except the petioles and the base of the midrib; veins 9–13 pairs, straight or slightly arching, usually forking before reaching the margin; petiole 8–20 mm. long; flowers small, numerous in rather dense racemes on short terminal or lateral leafy shoots of the season's growth, appearing when the leaves are about three-fourths grown but still mostly folded and very white tomentose; racemes 4–5 cm. long, the lower pedicels 8–17 mm. long, the pedicels and axis silky tomentose; flowers 8–16 mm. in diameter; hypanthium saucer-shaped, about 4 mm. in diameter; sepals triangular-lanceolate; petals obovate-oblong, broadest just above the middle, 7–10 mm. long; young fruit constricted below the hypanthium, top of the ovary woolly; mature fruit almost black, glaucous, sweet, and juicy. (*Húmilis*, low, referring to the habit of growth.)

Chiefly on rocky banks and dry situations. Very common in the southern half of the state, less frequent northward in the central part to Lake of the Woods. Apparently absent from the northeast corner. Vermont to Mackenzie and in the west, south to Nebraska. Blooms in the southern half of the state about the second week in May, fruit ripe about July 1. In the northern part it blooms and ripens the fruit about three weeks later.

3. Amelanchier florida Lindl. Bot. Reg. Table 1589. 1833.

SASKATOON

A. alnifolia of many American authors, questionably *A. alnifolia* Nutt. 1818.

A shrub 0.5–3 m. high; leaves broadly elliptical or broadly obovate, 3–4.5 cm.long, 2.5–4 cm. wide, base truncate, rounded or subcordate, apex rounded, subtruncate or rarely retuse, margin coarsely toothed usually only above the middle, teeth spreading, deltoid, young leaves tomentose on the under side, soon becoming entirely glabrous, usually before the flowers are fully expanded, veins about 8 pairs, branching and forming a network before reaching the margin, the upper pairs strongly ascending; petiole 15–20 mm. long, glabrous; flowers in short, dense erect racemes, mostly on short lateral

leafy shoots, appearing when the leaves are nearly grown and fully unfolded, 3–5 cm. long, lower pedicels 8–17 mm. long, axis and pedicels glabrous, flowers about 15–20 mm. in diameter; hypanthium open saucer-shaped, usually entirely glabrous, 3–4 mm. in diameter; sepals short triangular-lanceolate, slightly woolly inside; petals oblong, often rather narrow, 7–15 mm. long; young fruit constricted below the hypanthium, top of the ovary woolly, becoming almost glabrate in the mature fruit; mature fruit almost black, glaucous, sweet and juicy. (*Flórida*, flowering, referring to the conspicuous flowers.)

Apparently rare and confined to the extreme northern part of the state, the only collection of this species from Minnesota in the University herbarium being from Lake of the Woods. It occurs on Isle Royale and in northern Wisconsin and should be looked for along the north shore of Lake Superior and in the upper St. Croix Valley. Distributed from Upper Michigan and Western Ontario to Alberta and British Columbia, south to Colorado. Its range west of the Rocky Mountains is much in doubt.

Blossoms from late May to early July, fruit ripe in July and August. Very sweet and juicy and extensively used in the Canadian prairie provinces.

AMELANCHIER BARTRAMIANA AMELANCHIER HUMILIS AMELANCHIER LAEVIS
(×½)

4. Amelanchier laevis Wiegand, Rhodora, 14: 154: 1912.

A. canadensis of many American authors, including Britt. & Brown, Ill. Flora, ed. 1, and Gray's Manual, ed. 7, not *A. canadensis* L.

A tall, irregularly branched shrub or small tree up to 13 m. high (seldom over 7 m. in Minnesota); leaves elliptical, ovate, or ovate oblong, mostly rounded or slightly cordate at the base, rarely narrowed, short acuminate at the apex, 4–9 cm. long, 2.5–6 cm. broad, margin sharply and evenly serrate nearly to the base, the teeth with a low rather blunt body, and a mucro-

like, callus-tipped point, size of teeth nearly proportionate to the size of the leaf, 2–8 per cm.; young leaves glabrous or with a few silky hairs, usually purple-bronze in color, rarely green, mature leaves wholly glabrous, firm in texture, dark green above, paler beneath, somewhat glaucous; primary lateral veins 8–17 on each side, irregularly spaced, arching upward, and anastomosing near the margin, interspersed with shorter and smaller lateral veins; petiole 12–25 mm. long, slender, glabrous or with a few long silky hairs; flowers in drooping, few- to many-flowered, loose racemes, appearing when the leaves are about half grown, and mostly unfolded; racemes 4–6 cm. long; lower pedicels 15–33 mm. long, pedicels and axis glabrous; flowers large and showy, 2–3 cm. in diameter; hypanthium campanulate, 3–5 mm. in diameter; sepals triangular-lanceolate, 3–4 mm. long, soon reflexed, glabrous on the outside, loosely tomentose within; petals oblong-linear, or narrowly obovate or obcordate, 10–18 mm. long; young fruit not constricted below the hypanthium, top of ovary exposed, glabrous or sparsely pubescent; mature fruit purple or nearly black, glaucous, borne on very long pedicels (the lowest 3–5 cm. long). (*Laévis*, smooth.)

Common in the edge of woods, moist hillsides, ravines, etc., in the eastern part of the state, apparently wanting in the prairie districts and in the northeast corner. Newfoundland to Minnesota, south to Pennsylvania and Kansas, and southward mostly in the mountains to Georgia and Alabama. Blooms in the southern part of the state in April and early May, northwards up to early June, fruit ripe in June and July.

5. Amelanchier canadensis (L.) Medic. Gesch. 79. 1793.

JUNE-BERRY

Mespilus canadensis L. Sp. Pl. 1753.

Pyrus Botryapium L. f. Suppl. 255, 1781.

Amelanchier Botryapium and *A. canadensis* var. *Botryapium* of many American authors.

A tall, irregularly branched shrub or small tree 5–10 m. high; leaves mostly obovate, rarely ovate or oblong, mostly cordate at the base, and acuminate at the apex, 4–10 cm. long, 2.2–5 cm. wide; margin sharply and finely serrate to the base, the teeth ovate-triangular, acuminate, 6–10 per cm.; young leaves densely white tomentose below, sparingly so above, green, mature leaves with more or less persistent tomentum; primary lateral veins 11–17 on each side, irregularly spaced and anastomosing towards the margin, interspersed with shorter lateral veins; petiole 1–2 cm. long, pubescent; flowers in rather dense nodding racemes, appearing either before or with the leaves, racemes 3–5 cm. long, lower pedicels 8–17 mm. long; axils and pedicels pubescent, flowers medium-sized, 2–2.5 cm. in diameter; hypanthium campanulate, 2.5–3 mm. in diameter; sepals broadly oblong-triangular,

abruptly acuminate or obtuse, soon reflexed, tomentose on both sides; petals linear or linear-oblong, 10–15 mm. long; young fruit not constricted below the hypanthium, summit of ovary glabrous; mature fruit reddish purple, scarcely edible. Blossoms in April or early May, fruit ripe about the end of June. (*Canadénsis*, Canadian, a name applied in the 18th century to many American plants irrespective of the locality.)

Apparently infrequent and confined to the southeast corner of the state. Maine to Minnesota, south to Georgia and Arkansas.

6. Amelanchier stolonifera Wiegand, Rhodora, 14: 144. 1912.

A stiff upright shrub 3–12 dm. high, forming patches; leaves elliptical, oblong-elliptical or orbicular, base rounded, rarely subcordate with a narrow sinus, apex rounded, subacute or subtruncate, mucronate, 2.5–5 cm. long, 2–3.5 cm. wide, margin finely and sharply serrate along the upper two-thirds of the leaf, the lower one-third nearly entire, the teeth with a low broad body and oblique mucro; young leaves green, glabrous above, densely white tomentose beneath, mature leaves glabrous throughout or the petioles and midrib remaining somewhat pubescent; primary lateral veins 7–11 on each side, usually curved upward and becoming indistinct and anastomosing towards the margin; petiole slender 10–18 mm. long, glabrous or somewhat pubescent; flowers in short, dense, erect racemes, appearing when the leaves are half grown and unfolding, 1.5–4 cm. long; lower pedicels 7–15 mm. long; pedicels and axis silky tomentose or almost glabrous; flowers small, about 1–1.5 cm. in diameter; hypanthium open, saucer-shaped, 3–4 mm. in diameter, sepals triangular-lanceolate, 2.5–3 mm. long, soon reflexed, inner surface tomentose; petals obovate-oblong, 7–9 mm. long; young fruit somewhat constricted below the hypanthium, top of ovary densely woolly; mature fruit purplish black, glaucous, sweet and juicy. (*Stolonífera*, stolon-bearing.)

The only Minnesota collection is from the north shore of Lake Superior at the mouth of the Brule River. In non-calcareous soils, Newfoundland, coastal plain from Maine to Virginia, also on the shores of the Great Lakes. Blooms (on the north shore of Lake Superior) in late June.

7. Amelanchier Bartraminiana (Tausch) Roemer, Syn. Mon. 3: 145. 1847.

A. oligocarpa Roemer, 1847.

A shrub 0.5–2.5 m. high, stems several together, fastigiate; leaves elliptical or oblong-elliptical to somewhat obovate, 3–5 cm. long, 1.5–3 cm. wide, base narrowed, acute, apex mostly acute or rarely somewhat rounded, margin sharply and often doubly serrate to below the middle, the teeth very

variable, 6–12 per cm.; young leaves glabrous except at the base, glaucous, flat from the beginning, mature leaves bright green above, paler and glaucous beneath; veins indistinct, primary lateral veins very irregular, anastomosing; petiole stout, 2–7 mm. long, sparsely silky pubescent; flowers solitary or rarely 2–3 together, appearing when the leaves are about half grown, about 15 mm. in diameter; pedicels glabrous, 10–25 mm. long; hypanthium broadly campanulate, 3–6 mm. in diameter; sepals narrowly triangular, with wide sinuses, 3–4 mm. long, glabrous outside, tomentose within, tardily more or less reflexed; petals elliptical or obovate, broad, 6–9 mm. long; young fruit somewhat constricted below the hypanthium, top of the ovary woolly, the base of the style persistent; mature fruit about 1 cm. in diameter, dark purple, edible. (*Bartramiána*, named for the early American botanist, William Bartram.)

Limited to the northeastern corner of the state. Labrador to western Ontario, south, chiefly in mountainous districts to northern New England, Pennsylvania, and the Lake Superior region. (See cut, p. 217.)

15. PRUNUS L. Sp. Pl. 473. 1753.

PLUM, CHERRY

Trees or shrubs, sometimes spiny; leaves alternate, simple, mostly serrate, and often bearing glands along the petiole or at the base of the blade, stipules small and early deciduous; flowers sometimes solitary but mostly in umbel-like clusters or racemes, white or pink; hypanthium campanulate or obconic; sepals 5; petals 5, spreading; stamens 15–30, distinct, inserted with the petals on the hypanthium; pistil normally 1, simple, superior in the bottom of the hypanthium, style 1, stigma capitate; ovules 2; fruit a drupe; stone globose or oval and flattened, smooth or somewhat roughened, usually 1-seeded. (*Prúnus*, the classical Latin name for the plum.)

A genus of about 150 species mostly of temperate climates of the northern hemisphere. In North America there are about 30 native species some of which are of importance in horticulture.

1. Flowers single (i.e., petals normally 5). CHERRIES AND PLUMS.
   a. Trees or large shrubs; leaves broad or, if narrow, serrate almost to the base.
      (1) Flowers in racemes, terminating short leafy shoots. CHOKE CHERRIES.
         (a) Small trees or large shrubs; bark smooth; leaves elliptic or oval to obovate; principal lateral veins beneath prominent; only basal part of hypanthium persisting as a collar in fruit.
            m. Racemes loose-flowered, pendulous or spreading; petals about twice as long as stamens; hypanthium hairy within; stone strongly corrugated . . . . . 1. *P. Padus*
            n. Racemes dense-flowered, ascending or horizontal; petals about as long as stamens; hypanthium smooth or nearly so within; stone smooth . . . . . 2. *P. virginiana*

(b) Medium-sized to large tree; bark rough; leaves oblong to oblong-lanceolate; principal lateral veins beneath not raised; entire hypanthium persistent in fruit 3. *P. serotina*

(2) Flowers in umbel-like clusters, appearing from clustered buds, with or before the leaves.

(a) Branches usually thorny or armed; fruit subglobose or sulcate, usually borne singly. PLUMS.

m. Foliage purple; small tree; cultivated 4. *P. cerasifera* var. *Pissardi*

n. Foliage green; native trees.

x. Teeth of leaves gland-tipped; calyx lobes glandular; stone much flattened 5. *P. nigra*

y. Teeth of leaves acute, bristle-tipped; calyx lobes not glandular; stone round 6. *P. americana*

(b) Branches not thorny or armed; fruit globose, not sulcate, usually in clusters. CHERRIES.

m. Flowers in corymbs; petals 4–6 mm. long; fruit 3–6 mm. in diameter; native tree or shrub 7. *P. pennsylvanica*

n. Flowers in umbels; petals 8–12 mm. long; fruit 8–25 mm. in diameter; cultivated.

x. Trees 4–8 m. high, fruit red, 8–15 mm. in diameter 8. *P. Cerasus*

y. Shrubs or shrub-like trees 1–2.5 m. high; fruit dark red or nearly black, 2–2.5 cm. in diameter.

(x) Flowers numerous, fruit black or nearly so, in dense, numerous clusters along the slender branches 9. ×*P. zumbra*

(y) Flowers less numerous; fruit dark red, not densely crowded on the branches 10. × *P. Knudsoni*

b. Dwarf shrubs (3–15 dm. high); leaves relatively narrow, not serrate at the cuneate base. SAND CHERRIES.

(1) Leaves usually narrowly oblanceolate-spatulate and acute; flowering branches generally wand-like 11. *P. pumila*

(2) Leaves oblong-spatulate to oval or somewhat obovate.

(a) Petioles 5–10 mm. long; leaves 3–6 cm. long, obtuse or sometimes acute at the apex; fruit 10–14 mm. in diameter; branches erect or ascending 12. *P. susquehanae*

(b) Petioles 5–6 mm. long; leaves 3–4.5 cm. long acute or rarely obtuse at the apex, thick and firm; fruit about 15–18 mm. in diameter; branches irregularly spreading 13. *P. Besseyi*

2. Flowers double (i.e., with numerous petals). FLOWERING ALMONDS and FLOWERING PLUMS.

a. Leaves obovate, abruptly acuminate, sharply serrate.

(1) Leaves densely tomentose beneath 14. *P. tomentosa*

(2) Leaves sparingly pubescent on both sides, often tending to be 3-lobed at the apex 15. *P. triloba*

b. Leaves oblong-lanceolate, blunt or acutish at the apex, crenate-serrate, the serrations glandular-serrulate 16. *P. glandulosa*

1. Prunus Padus L. Sp. Pl. 473. 1753.

EUROPEAN BIRD CHERRY

A small tree 5–10 m. high; bark dull dark gray, inner bark yellow with disagreeable odor; leaves elliptic or oval to oblong-ovate or obovate, 6–10 cm. long, 3–6 cm. wide,

PRUNUS VIRGINIANA (above)

PRUNUS SEROTINA (below)

slightly obliquely rounded or subcordate at the base, acute to short acuminate at the apex, finely and sharply serrate, dark green and glabrous above, somewhat bluish green and glabrous beneath or sometimes with tufts of rusty pubescence in the axils of the principal veins; petiole 10–15 mm. long, usually with two prominent glands near the base of the blade; racemes rather loose-flowered, 7–15 cm. long, spreading or drooping; flowers white, 13–16 mm. in diameter; hypanthium short campanulate, woolly pubescent within, only its base remaining as a collar at the base of the ripe fruit; sepals ovate, about half as long as hypanthium, prominently glandular-serrate; petals obovate, about twice as long as stamens; pedicels 6–10 mm. long, sometimes up to 20 mm; fruit 6–8 mm. in diameter, black when ripe, bitter; stone prominently corrugated. (*Pádus*, the ancient Greek name for this species of cherry.)

Occasionally planted as an ornamental tree. Native of Europe and Asia. Blossoms in May.

2. Prunus virginiana L. Sp. Pl. 473. 1753.

CHOKE CHERRY

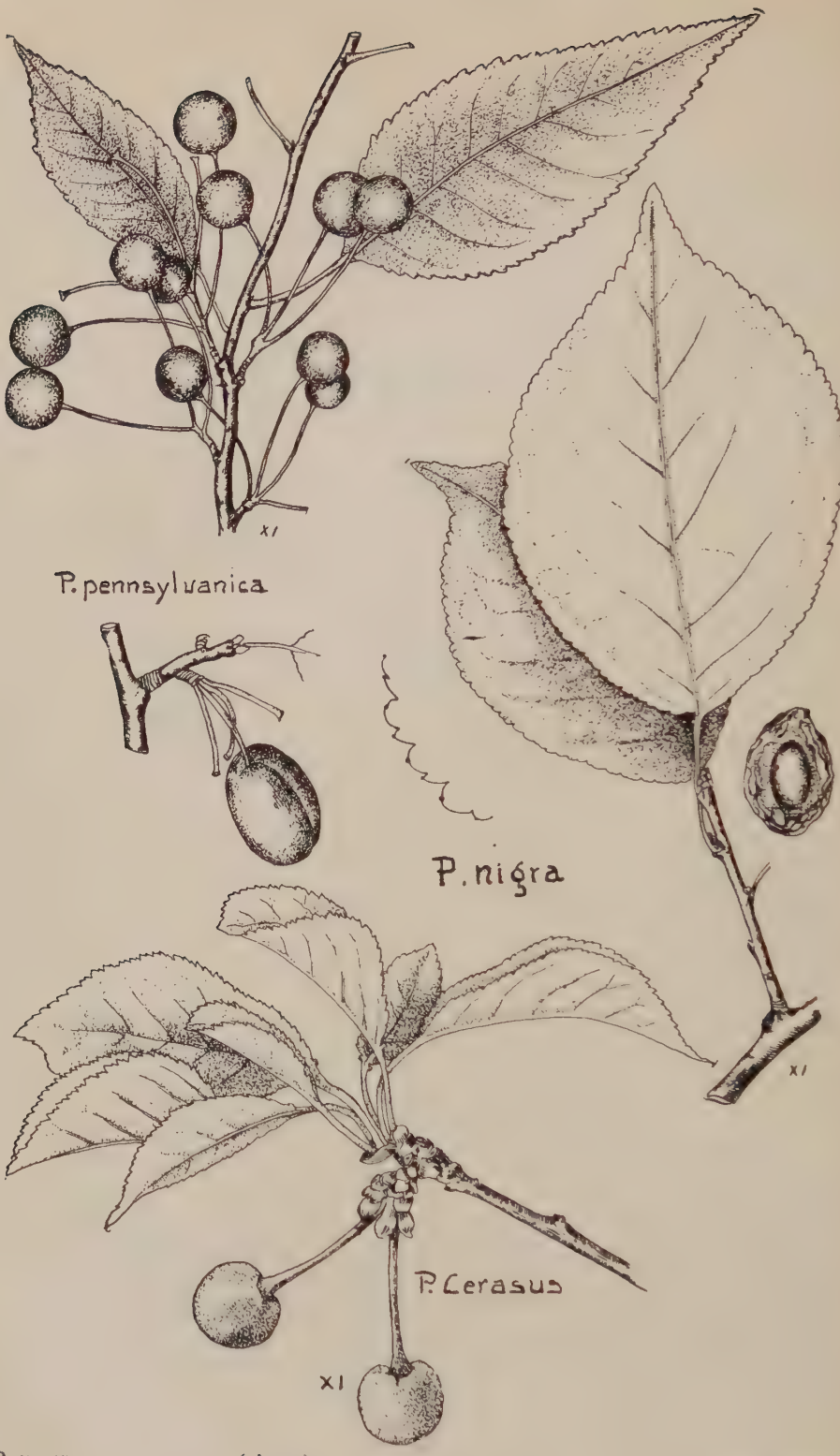
A tall shrub or small tree 1–4 m. high with grayish brown bark, the inner layers of which have a strong disagreeable odor, lenticels numerous, light-colored; leaves oval, oblong, or obovate, 4–8 cm. long, 2–4.5 cm. wide, acute or short acuminate at the apex, rounded or sometimes narrowed at the base, sharply and finely serrate, dark green and glabrous above, somewhat paler beneath, glabrous or slightly pubescent along the veins; the lateral nerves prominent, the reticulate veins appearing dark against the paler background, becoming impressed in drying; petiole 1–1.5 cm. long, with 1–several glands; racemes erect or spreading, dense-flowered, 5–12 cm. long; flowers white, strong-scented, 8–10 mm. broad; hypanthium short campanulate, nearly glabrous within, only its base remaining as a small collar at the base of the fruit; sepals ovate, glandular-serrate; petals obovate, slightly exceeding the stamens; stamens about 30; pedicels 4–6 mm. long; fruit dark red or nearly black, 8–10 mm. in diameter, very astringent; stone globose, smooth. (*Virginiána*, Virginian.)

Common throughout the state. Newfoundland and Hudson Bay to Saskatchewan, south to North Carolina and Kansas. Its varieties, or closely related species, occur in all the western states. Blossoms in May, fruit ripe in July and August.

3. Prunus serotina Ehrh. Beitr. 3: 20. 1788.

WILD BLACK CHERRY, CABINET CHERRY, RUM CHERRY

A medium-sized to large tree 12–25 m. high and 2–6 dm. in diameter (in more southern latitudes reaching much greater dimensions); bark of trunk dark brown, very rough and peeling off in flakes, bark of young branches and twigs reddish brown, the inner layers fragrant; lenticels numerous; leaves narrowly ovate to elliptic-lanceolate, 4–12 cm. long, 2.5–3.5 cm. wide, mostly narrowed at the base, long acuminate at the apex, serrate with



PRUNUS PENNSYLVANICA (above)

PRUNUS NIGRA (right)

PRUNUS CERASUS (below)

appressed callous teeth, of firm texture, glabrous and shining above, glabrous or sparingly pubescent along the veins beneath, the lateral veins not prominent, the reticulate veins not appearing darker against the background, becoming more or less raised in drying; petiole 10–18 mm. long with 2–4 glands; racemes spreading or erect, 8–15 cm. long; flowers numerous, white, 8–10 mm. broad; pedicels 8–10 mm. long; hypanthium short campanulate, nearly glabrous within, persisting at the base of the fruit; sepals oblong to triangular, separated by broad sinuses, more or less glandular-serrate, persistent; petals obovate, about 4 mm. long; stamens 20, about as long as the petals; fruit black, globose, 7–10 mm. in diameter, dark purple to black, edible but somewhat astringent; stone smooth. (*Serótina*, autumnal, referring to the late ripening of the fruit.)

Occurs practically throughout the state except in the region north of Lake Superior, most common in the southeast and in the Big Woods. Nova Scotia to South Dakota, south to Florida and Texas. Blossoms in May or early June, nearly two weeks later than *P. virginiana*, fruit ripe in August and September.

The wood is bright red-brown, close-grained and hard, weighing 36 lbs. It takes a beautiful finish, and is extensively used in cabinet-making—with the exception of black walnut, probably the finest of our native woods.

4. **Prunus cerasifera** var. **Pissardi** Koehne, Dendrol. 317. 1893.

A large shrub or small tree, generally somewhat thorny, with slender branches and ovate, reddish purple leaves; flowers born singly, appearing with the leaves, about 2 cm. in diameter, pink; fruit dark wine-red. (*Cerasífera*, cherry-bearing; *Pissárdi*, named for M. Pissart.)

Introduced to France by M. Pissart, gardener to the Shah of Persia; occasionally cultivated in this country as an ornamental tree on account of its attractive foliage. This small tree does not grow very satisfactorily in Minnesota but a form with similarly colored leaves, a cross between the variety and the Omaha Plum (*P. americana*×*triflora*), developed at the State Fruit Breeding Farm at Zumbra Heights and known as the Newport Plum, has proven entirely hardy for the general region. It is a tree with deep reddish purple foliage, which retains its color throughout the season; the fruit is small to medium-sized, but of poor quality.

6. **Prunus nigra** Ait. Hort. Kew. 2: 165. 1789.

CANADA PLUM, WILD PLUM

A shrub or small tree 2–7 meters high, armed with thorns; bark brownish gray, exfoliating in plates; leaves oval to broadly ovate, 7–13 cm. long, 3–7 cm. wide; obtuse or slightly cordate at the base, long acuminate at the apex, crenate-serrate, the teeth usually gland-tipped, pubescent when young, petiole 1–1.5 cm. long with 1 or 2 red glands near the base; flowers in lateral umbels, opening before the leaves, 2.5–3 cm. broad, very fragrant; calyx lobes glandular-serrate, glabrous within; petals white, pinkish-tinged towards the base, broadly obovate, 1.2–1.4 cm. long; stamens pinkish-tinged; fruit

orange-pink or yellow, subglobose or compressed ovoid, with little or no bloom, 2.5 cm. long; stone oval, compressed or flattened. (*Nígra*, black.)

River banks and thickets in the eastern part of the state from north to south, infrequent. Distributed from Newfoundland and New England westward to the Great Lakes, Lake Winnipeg and south to Iowa. Flowers in May, fruit ripe in August.

The fruit is very delicious, rather firm-fleshed, used for jellies and preserves.

6. **Prunus americana** Marsh. Arb. Am. 111. 1785.

WILD PLUM

A shrub or a small tree 3–10 m. high; branches more or less thorny; bark thick and rough, dark brownish gray, exfoliating in irregular plates; leaves ovate or obovate, rounded at the base, long acuminate at the apex, sharply and doubly serrate, the teeth bristle-tipped, not glandular, pubescent when young, glabrous or nearly so when mature, 4–10 cm. long, 2–5 cm. wide; petiole with or without glands, about 1 cm. long; flowers in sessile, lateral umbels, opening before the leaves, white, 1.5–2.5 cm. broad, very fragrant; pedicels 1.5–2.5 cm. long; calyx lobes entire, hairy on the inner surface; petals narrowly obovate, about 1 cm. long; fruit subglobose, red or yellow, 1.5–2 cm. in diameter, bloom light or none; stone but little flattened, slightly rugose. (*Americána*, American.)

Common in thickets, along roadsides, riverbanks, etc., throughout the state. Connecticut to Montana, south to Florida, New Mexico, and northern Mexico. Flowers in April and May, fruit ripe in August and September.

The fruit has a tough, astringent skin, and a pleasantly flavored, subacid, juicy flesh. It is frequently eaten raw, and is much used for making jellies and preserves. This and the preceding species are the source of nearly all the cultivated plums grown in Minnesota, in some cases directly, by selection, in others by hybridization with other species. (See cut, p. 228.)

7. **Prunus pennsylvanica** L. f. Suppl. 253. 1781.

PIN CHERRY, WILD RED CHERRY

A tall shrub or a small tree 5–10 m. high; bark light reddish brown, bitter and aromatic, on the trunk separating horizontally into broad, papery plates; leaves oblong-lanceolate, 4–8 cm. long, 1–3 cm. wide, rounded at the base, acute or acuminate at the apex, finely and sharply serrate, with unequal serrations, shining, green and glabrous on both sides, petiole 1–2 cm. long; flowers numerous, in umbel-like clusters, white, appearing with the leaves, 1–1.2 cm. broad; sepals 2 mm. long, glabrous; petals ovate, 5 mm. long; pedicels 1.5–2.5 cm. long; fruit globose, light red, 4–6 mm. in diameter, without bloom, its flesh thin and sour; stone globular. (*Pennsylvánica*, named from the original locality.)

Woods, thickets, and clearings, throughout the state except southwestward, very abundant in burned-over and cut-over land in the north. Distributed from Labrador to British Columbia and south to Pennsylvania, central Iowa, and in the mountains to North Carolina and Colorado.

The fruit is sometimes used domestically and in the preparation of medicine. The wood is soft, light, and close-grained, light brown in color and weighs 31 lb. Flowers in April and May, fruit ripe in August. (See cut, p. 224.)

8. Prunus Cerasus L. Sp. Pl. 474. 1753.

SOUR, PIE, OR MORELLO CHERRY

A small tree 2–4 m. high with a round crown; bark gray; leaves ovate to obovate, 4–8 cm. long, 2–5 cm. wide; rounded at the base, abruptly short-pointed at the apex, serrate, firm in texture and more or less glossy above; flowers in small clusters, from lateral buds appearing mostly before the leaves, large, 3–4 cm. broad; petals 1.2–1.5 cm. long; fruit depressed globose, 8–15 mm. in diameter. (*Cérasus*, Gr. cherry tree, from the town Cerasus in Pontus, where the cherry is native.)

Commonly cultivated in the southeastern part of the state. Introduced from southern Europe, probably native of Asia Minor. Flowers in May, fruit ripe in July. (See cut, p. 224.)

9. ×Prunus zumbra nomen nov.

ZUMBRA CHERRY

Prunus avium×[*pennsylvanica*×*pumila* (?)].

Low-growing tree of vigorous growth; leaves ovate, narrowed towards the base, acute at the apex, serrate, the serratures rather widely spaced, somewhat rugose and shining above; flowers in many-flowered umbels, along the slender branches of the previous season; fruit subglobose, in very dense cluster, 2–2.5 cm. in diameter, nearly black when ripe, flesh firm, greenish, sometimes tinged with red when fully mature, of good quality and with somewhat the flavor of the sweet cherry. (*Zúmbra*, named from the place of origin.)

A hybrid of not entirely certain parentage, developed at the State Fruit Breeding Farm at Zumbra Heights.

10. ×Prunus Knudsoni nomen nov.

COMPASS CHERRY

P. hortulana var. *Mineri*×*pumila* Ann. Rep. Minn. State Hort. Soc. 24:132. 1896.

A small tree 2–4 m. high; leaves oblong or oblong-oval, 5–9 cm. long, 2.5–4 cm. wide, narrowed or rounded towards the base, acute or short acuminate at the apex, serrate, with rounded or glandular teeth, dark green and glabrous above, paler and sparingly pubescent beneath; flowers appearing mostly before the leaves, about 2 cm. in diameter; pedicels 5–8 mm. long; hypanthium campanulate, sepals oblong, about as long as the tube, glandular; fruit dark red, 2–2.5 cm. in diameter; stone oval. (*Knúdsoni*, named for H. Knudson, a Minnesota horticulturist.)

Frequently cultivated, though the fruit is of little value. This hybrid was originated by H. Knudson as a cross between the Miner plum and a sand cherry, reported to be *P. Besseyi*, but more probably *P. pumila*, as it was obtained from eastern Minnesota. Blossoms in May, fruit ripe in early August.

PRUNUS PUMILA AND PRUNUS BESSEYI (above) PRUNUS AMERICANA (below)

11. **Prunus pumila** L. Mant. 75. 1767.

SAND CHERRY

A shrub with a willow-like habit of growth, 5–15 dm. high, the stems generally unbranched, erect and wand-like or sometimes branching near the base and ascending but never prostrate; young twigs angled, reddish brown, dotted with small lighter-colored lenticels; bark of stems and twigs of the previous season gray but turning dark brown with age; leaves oblanceolate to obovate or narrowly elliptic, 3–7 cm. long, 1–2.5 cm. wide, more or less acute at the apex, gradually narrowed to the base, serrate from below the middle, the serrations of the young leaves appressed and obscure but becoming much more prominent with age and on the leaves which appear later in the season, bright green above, somewhat paler beneath and with prominent veins, glabrous throughout; petiole 6–12 mm. long; stipules subulate, 4–7 mm. long, conspicuously fimbriate; flowers in fascicles of 2–4, appearing with the leaves, 10–15 mm. in diameter, sepals oblong, 2–2.3 mm. long, serrulate-margined; pedicels 10–14 mm. long, slender, fruit globose, 10–15 mm. long, nearly black when ripe, usually astringent and of poor quality; stone ovoid, more or less pointed at the apex, slightly grooved on either side of the ventral ridge. (*Púmila*, dwarf, referring to the low stature.)

Common on sandy lake shores, outwash plains, and dunes, especially in the east central part of the state, less frequent northwestward to Otter Tail County, the upper Mississippi and the shores of Lake of the Woods. Distributed from western New York to Manitoba, south to Indiana, Wisconsin, and southeastern Minnesota. Blossoms from about the middle of May until early June, fruit ripe in July and August.

12. **Prunus susquehanae** Willd. Enum. Pl. Hort. Berol. 519. 1809.

APPALACHIAN CHERRY

Prunus cuneata Raf. Ann. Nat. 11. 1820.

A low shrub 3–12 dm. high, with ascending or erect stems, often considerably branched and bushy; young twigs glabrous, at first reddish brown, becoming gray with age, lenticels generally numerous but small and obscure; leaves elliptic to narrowly obovate or oblanceolate, 3–6 cm. long, 8–22 mm. wide, obtuse or sometime acute at the apex, gradually narrowed towards the base, usually serrate above the middle but the teeth mostly obscure and with incurved points, green and glabrous above, pale and glaucous beneath; petioles 5–10 mm. long; stipules subulate 4–5 mm. long, with fimbriate margins, deciduous; flowers mostly in fascicles of 3, appearing with or shortly after the leaves, 10–12 mm. in diameter; sepals ovate-oblong, 1.5–2 mm. long, with serrulate margins; pedicels very slender, 6–10 mm. long; fruit nearly black, subglobose, 10–14 mm. long; pedicels slender, 6–12 mm.

long; stone oblong-ovate, somewhat pointed at the apex, 7–9 mm. long, 5–6 mm. in diameter. (*Susquehánae*, referring to the original locality on the banks of the Susquehanna River.)

Mostly in stony or rocky situations in the eastern part of the state from the Canadian border to Winona and Houston counties where it is fairly frequent on the summits of the high bluffs and along the outcrops of sandstone. Distributed from Maine to Pennsylvania, westward to Wisconsin, Minnesota, and Manitoba.

This species differs from the preceding in the less wand-like habit of growth, and in the shorter and blunter leaves with less prominent serrations, the teeth being low with incurved points.

13. Prunus Besseyi Bailey, Bull. Cornell Exp. Sta. 70: 261. 1894.

WESTERN SAND CHERRY

A low, bushy shrub 3–12 dm. high, the branches diffuse, spreading or more or less prostrate, not strict; bark grayish; leaves oval-elliptic or oblong-obovate, rarely narrower and oblanceolate, 3–3.5 cm. long, 9–12 mm. broad, acute or rarely obtuse at the apex, cuneate at the base, serrate from below the middle, thick and somewhat rugose, glabrous on both surfaces; petiole 5–6 mm. long; flowers in fascicles of 3–4, appearing with or before the leaves, 10–12 mm. in diameter; pedicels and calyx glabrous, pedicels 6–7 mm. long; fruit globose or somewhat oblong, nearly black when ripe or sometimes yellowish, 15–18 mm. long, about as long as the stout pedicel; stone nearly globose to somewhat ovoid, 7.5–10 mm. long, mostly obtuse at the apex. (*Bésseyi*, named for Professor C. E. Bessey.)

Occurs on the prairie of the western tier of counties of the state, more particularly in Rock and Pipestone counties. Minnesota to Wyoming, south to Kansas and Colorado. Blossoms in April and May, fruit ripe in August.

Note. The three species of sand cherries are poorly defined and in Minnesota, at least, they seem to grade into each other almost imperceptibly. It is, therefore, nearly impossible to distinguish them on the characters that are generally given to differentiate the species, and it might be better to regard *P. pumila* as a single, somewhat polymorphic species, tending towards *P. susquehanae* in the eastern and *P. Besseyi* in the southwestern parts of the state.

14. Prunus tomentosa Thunb. Flor. Jap. 203. 1784.

NANKIN CHERRY

A compact, bushy-topped shrub, not over 1.5 m. high in cultivation; twigs of the first and second year more or less densely yellowish gray pubescent, slightly angled, later becoming brown with gradually exfoliating outer bark; leaves crowded, broadly oval to obovate, 3–7 cm. long, 2–4 cm. wide, abruptly acuminate at the apex, narrowed towards the base, rather coarsely serrate, dull green, rugose and more or less pubescent above, densely yellowish gray tomentose beneath; petiole 5–7 mm. long, stipules twice

as long as the petiole; flowers appearing shortly before the leaves, mostly 1 or 2 or else clustered on spurs, nearly sessile, 12–18 mm. in diameter; hypanthium narrowly campanulate, red; sepals erect or somewhat spreading; petals white or tinted (numerous in some forms); fruit globular, light red, slightly pubescent. (*Tomentósa*, tomentose or woolly pubescent.)

Native of China and Manchuria. The form most frequently cultivated in the northwest is the one with double flowers. Blossoms in May, fruit ripe in July.

PRUNUS GLANDULOSA

PRUNUS TRILOBA

15. Prunus triloba Lindl. Gard. Chron. 268. 1857.

FLOWERING PLUM

An erect shrub, 1–3 meters high, with spreading or ascending branches; bark brownish; young shoots reddish, puberulous or glabrous; leaves obovate, 3–6 cm. long, 2–4 cm. wide; cuneate at the base, 3-lobed and abruptly pointed at the apex, sometimes merely obtuse or acute, coarsely and doubly serrate, rough with a few bristly hairs and impressed-veined on the upper surface, prominently veined and with scattered hairs beneath; petiole 1–1.5 cm. long, pubescent along the upper side; flowers solitary, appearing before the leaves, 3–4 cm. broad, petals numerous, light pink; pistil hairy; the fruit usually does not set from the double flowers, from fertile flowers the fruit is small, red and shining when ripe. (*Triloba*, 3-lobed, in reference to the leaf.)

Native of China. The commonly cultivated form is the one with double flowers (f. *plena* Dipp.). It is entirely hardy in our climate but is not as free-flowering as the following species. Flowers in May.

16. Prunus glandulosa Thunb. Flor. Jap. 202. 1784.

FLOWERING CHERRY, FLOWERING ALMOND

P. japonica of various authors, including Minn. T. and S. 1912, not Thunb.

A shrub 8–12 dm. high; branches erect or ascending, reddish, especially on the upper side, glabrous; leaves oblong-lanceolate or lanceolate, 4–8 cm. long, 1–3 cm. wide, narrowed or slightly rounded at the base, tapering above, but usually blunt at the apex, crenate-serrate, the serrations glandular-serrulate, glabrous above, pubescent on the veins beneath, the veins and reticulations prominent beneath; petioles 3–4 mm. long, pubescent; stipules lance-linear, generally remotely glandular-serrate, 5–6 mm. long; flowers appearing just before or with the leaves, single or in clusters of 2–3, blush pink or sometimes paler, 2–3 cm. in diameter; petals very numerous, stamens few or lacking, the double flowers usually producing no fruit (when formed, the ripe fruit is globular or short oblong, about 12 mm. in diameter, red, smooth and shining). (*Glandulósa*, glandular, probably referring to the glandular serrations of the leaf.)

Native of central and northern China and Japan. The form in cultivation in the state is the one with double flowers (f. *sinensis* Koehne). It is a handsome ornamental shrub and is reasonably hardy but does best with a slight covering during the winter. Blossoms in April or early May.

LEGUMINOSAE PULSE OR PEA FAMILY

Herbs, shrubs, vines, or trees; leaves alternate, mostly compound, with stipules; flowers perfect, monoecious, dioecious, or polygamous, in spikes, heads, racemes, or panicles, apopetalous, hypogynous, or perigynous and regular or irregular; sepals 3–5, more or less united; petals 5, rarely fewer; stamens 10, more or less united by their filaments or distinct; pistil 1, simple, 1–many-seeded, becoming a pod or legume in fruit. The typical flower of this family, e.g., the pea, has the sepals united into an irregular cup; the petals of three forms, an upper odd petal (standard), two lateral, spreading petals (the wings), and two lower ones (the keel), more or less united and enclosing the stamens and pistil; nine of the stamens united by their filaments into a group, the tenth stamen free.

An immense family numbering fully 12,000 species, widely distributed from the tropics to the frigid zones.

1. Flowers regular or nearly so, imperfect, monoecious or dioecious; large trees.
   a. Leaflets ovate, acuminate at the apex, margin entire; calyx tube elongated; stamens 10 — 1. *Gymnocladus*
   b. Leaflets oblong-lanceolate, rounded at the apex, margin crenulate-serrate; calyx tube short; stamens 3–5 — 2. *Gleditsia*
2. Flowers irregular, papilionaceous (sometimes with only 1 petal), perfect; trees or shrubs.
   a. Flowers numerous, in spikes or racemes, not yellow.
      (1) Flowers small, in dense spikes, 1-petaled; pods less than 2 cm. long — 3. *Amorpha*
      (2) Flowers large, in drooping racemes; pods over 2 cm. long — 4. *Robinia*
   b. Flowers solitary or in few-flowered racemes, yellow — 5. *Caragana*

1. GYMNOCLADUS Lam. Encycl. 1: 733. 1783.

KENTUCKY COFFEE-TREE

Trees with rough bark and stout branchlets; leaves large and bipinnate; flowers showy, in terminal racemes, monoecious or dioecious; calyx tubular, 5-lobed, lobes narrow; petals 5, oblong, equal, inserted at the top of the calyx tube; stamens 10, distinct, short; pistil rudimentary or lacking in the staminate flowers, sessile and many-ovuled in the pistillate and polygamous ones; fruit an oblong pod, flat, hard, pulpy inside; seeds numerous. (*Gymnócladus*, Gr. *Gymnos*, naked, *clados*, branch, in allusion to the stout, naked branches.)

A monotypic genus of eastern North America.

GYMNOCLADUS DIOICA
(Leaf and pod ×⅓, flowers nearly natural size)

Gymnocladus dioica (L.) K. Koch, Dendrol. 1: 5. 1869.

KENTUCKY COFFEE-TREE

Tree attaining a height of 15–30 m. and a trunk diameter of 1.5–8 dm.; bark gray, deep-fissured and roughened by persistent scales; buds small, in hairy cavities, 2 in the axil of each leaf, one above the other, the lower sterile; leaves large, 6–9 dm. long, bipinnate, the pinnae with 7–15 leaflets each, leaflets stalked, ovate, 2–10 cm. long, 2–6 cm. wide, rounded at the base, acute or acuminate at the apex, sometimes pubescent on the veins beneath; racemes many-flowered, 10–18 cm. long; flowers 15–18 mm. long; calyx tube campanulate, 1 cm. long; pod 12–25 cm. long, 4–5 cm. wide. (*Dioica*, dioecious.)

In the southeastern part of the state as far north as St. Paul and westward in the Minnesota River Valley to New Ulm. Common in the Mississippi River Valley and westward along some of the tributaries. Distributed from New York and Pennsylvania

to Minnesota, Nebraska, and Kansas, southward between the mountains to the middle of Tennessee.

The wood is heavy but not very hard, strong and coarse-grained and very durable in contact with the soil. It is light brown in color and takes a good polish, weight 48 lbs. Frequently planted as a park tree but not very ornamental. Flowers in June.

2. GLEDITSIA L. Sp. Pl. 1056. 1753.

HONEY LOCUST

Thorny trees (sometimes unarmed) with evenly, once or twice pinnate leaves; thorns branched or simple, situated above the axils of the leaves, often very large; flowers small, greenish, in axillary spikes; calyx short, 3–5-cleft; petals equal, the two lower sometimes united; stamens 3–10, distinct; pistil rudimentary or none in the staminate flowers, in the pistillate ones elongated or ovoid; ovules 2–many; pods flat, nearly straight at first, twisted at maturity, pulpy between the seeds. (*Gleditsia*, named for J. G. Gleditsch, a German botanist who lived at the same time as Linnaeus.)

A genus of 5 species, natives of eastern North America and Asia; in addition to the following one other species occurs in the southeastern part of the United States.

1. Gleditsia triancanthos L. Sp. Pl. 1056. 1753.

HONEY LOCUST

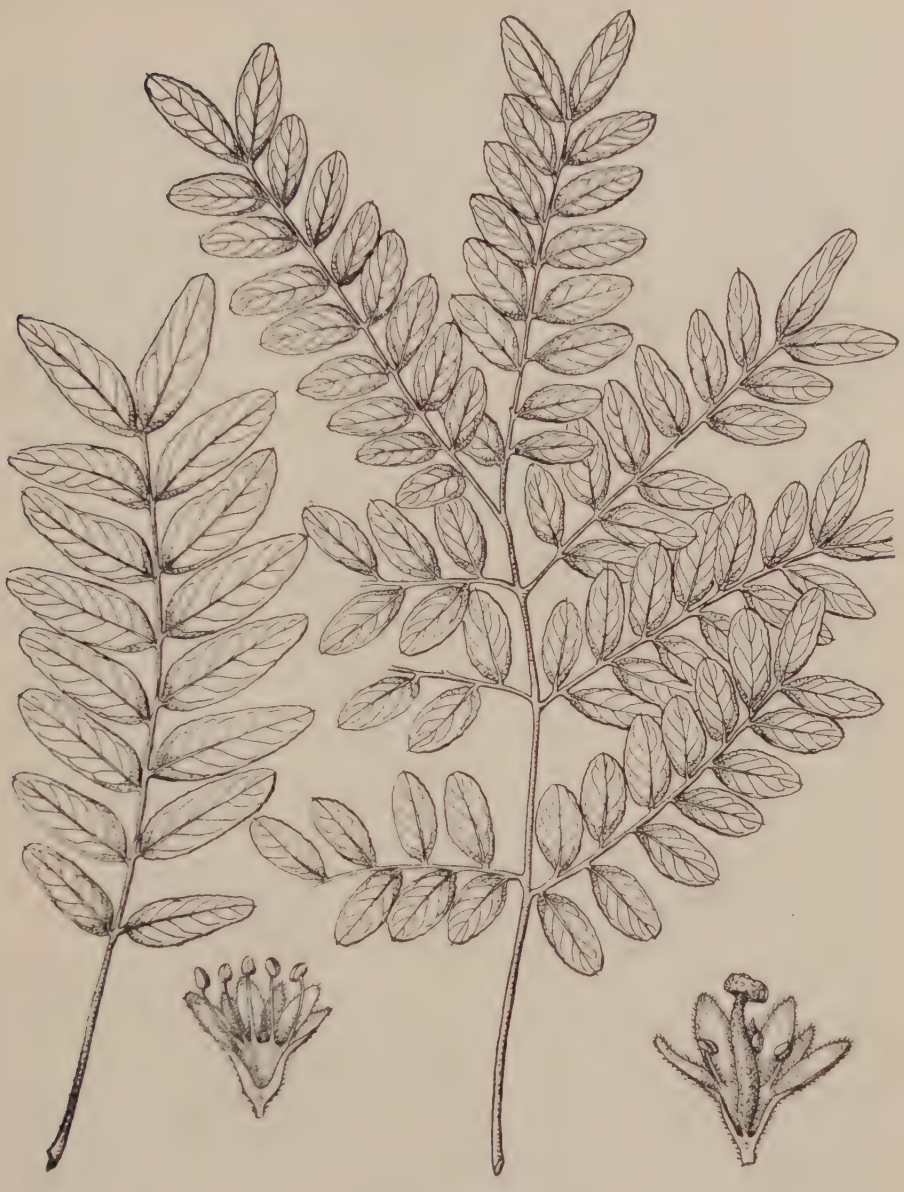
Tree attaining a height of 15–20 m. within our range, and a trunk diameter of 15–40 cm.; bark dark brown, fissured; thorns large and numerous, simple or branched; branches slender,spreading or somewhat pendulous, with numerous lenticels; buds minute, several together and superposed, upper ones with scurfy scales, the others hidden by the base of the petiole; leaves 1–2-pinnate, 10–20 cm. long; leaflets short-stalked, oblong-lanceolate, somewhat crenulate, 2–3 cm. long, 6–10 mm. wide; inflorescence 5–10 cm. long, the staminate more slender than the pistillate; calyx obconic; pods 15–45 cm. long, bent or twisted, pulp sweetish, edible. (*Triacánthos*, three-spined.)

On the Mississippi River bottom lands of Houston County. Distributed from the Allegheny Mountains of Pennsylvania through southern Ontario to Minnesota, Nebraska, Kansas, south to Texas, Alabama, and Mississippi.

The wood is red or light reddish brown in color; it is coarse-grained, hard, strong, and durable in contact with the soil, weight 42 lbs. It is used for fence posts, rails, hubs of wheels, etc. Frequently planted as a park tree.

1a. G. triacanthos var. inermis Pursh. Fl. Am. Sept. 221. 1814.

A form of the species, almost or quite thornless; occasionally cultivated in the state. (*Inérmis*, unarmed, referring to the lack of thorns.)



GLEDITSIA TRIACANTHOS
(Leaves ×⅔, staminate flower ×4, pistillate flower ×4)

3. AMORPHA L. Sp. Pl. 713. 1753.

FALSE INDIGO

Branching shrubs with odd-pinnate, compound leaves; leaflets marked with minute dots or glands; flowers violet or purple, in dense terminal spikes; calyx teeth 5, nearly equal; only one petal, the standard, present, wrapped around the stamens and style; stamens 10, united at the base; pistil 2-celled; fruit an oblong pod, exceeding the calyx, 1–2-seeded, tardily splitting. (*Amórpha*, Gr. *Amorphos*, without form, referring to the absence of four of the petals.)

A genus of about 15 species, natives of North America and Mexico.

1. Tall shrub, 1–3 m. high; leaflets 2–5 cm. long — 1. *A. fruticosa*
2. Low shrubs, 3–14 dm. high; leaflets 6–12 mm. long.
   a. Densely silky hairy all over, 3–14 dm. high — 2. *A. canescens*
   b. Smooth or nearly so throughout, 3 dm. high or less — 3. *A. microphylla*

1. Amorpha fruticosa L. Sp. Pl. 713. 1753.

FALSE INDIGO

A shrub, 1–3 m. high; leaves 15–30 cm. long; leaflets 9–25, short-stalked, oblong or broadly elliptic, rounded and mucronate at the tip, rounded or slightly narrowed at the base, 2–3.5 cm. long, 1.2 cm. wide; spikes 7–15 cm. long, clustered or solitary; flowers very numerous, purple, 7–10 mm. long; stamens exserted, with bright orange anthers; pod 5–10 mm. long with numerous dark glands, thick-stalked. (*Fruticósa*, shrubby.)

Along banks of rivers, streams, and lakes, common throughout the state except northeast. Distributed from Ohio to Manitoba, south to Florida, Colorado, and Chihuahua. Flowers in June and July, fruit ripe in August.

2. Amorpha canescens Pursh, Fl. Am. Sept. 2: 467. 1814.

LEAD-PLANT, SHOE-STRINGS

A bushy shrub, 3–14 dm. high, densely white canescent all over; stems longitudinally ridged or furrowed; leaves 5–10 cm. long, leaflets 21–49, crowded, oblong-elliptic, short-stalked, rounded at the base, obtuse or acutish and mucronate at the apex, less hairy on the upper than on the lower side, 8–14 mm. long, 4–9 mm. wide; spikes densely clustered at the summit of the stems, 5–18 cm. long; flowers deep purple; stamens orange-yellow; pods 1-seeded, slightly exceeding the calyx in length. (*Canéscens*, hoary.)

Common on hills and prairies throughout the state except northeast. Distributed from Indiana to Manitoba, south to Louisiana, Texas, and New Mexico.

Flowers in June and July, fruit ripe in August and September.

3. Amorpha microphylla Pursh, Fl. Am. Sept. 2: 466. 1814.

FRAGRANT FALSE INDIGO

Amorpha nana Nutt. (?) 1813.

A low, bushy shrub 2–3 dm. high; branches glabrous or nearly so throughout; leaves 3–8 cm. long; leaflets 13–19, oval or oblong, rounded at the base, blunt and mucronate at the tip, glabrous or nearly so with glistening glands or dots, rather firm in texture; spikes usually only one to a branch, 4–7 cm. long; flowers fragrant, dark purple; pods 1-seeded, gland-dotted, about 3 mm. long. (*Microphýlla*, small-leaved,)

Common on prairies through the western part of the state from south to north. Distributed from Iowa to Manitoba, south to Kansas and Colorado. Flowers in May, fruit ripe in July.

AMORPHA MICROPHYLLA (above)

AMORPHA CANESCENS AMORPHA FRUTICOSA

4. ROBINIA L. Sp. Pl. 722. 1753.

LOCUST

Small to medium-sized trees or shrubs with rough and furrowed bark and spiny stipules or in the shrubby form bristly; leaves alternate, compound, odd-pinnate; leaflets oblong or ovate, short-stalked; flowers showy, white or deep rose color, in hanging axillary racemes; calyx 5-toothed, the

ROBINIA (×½)

two upper teeth slightly united; upper petal or standard rounded, reflexed, wings oblong, curved, blunt; stamens diadelphous; pistil stalked; ovules numerous; fruit a flat, linear pod, several-seeded. (*Robínia*, named for John and Vespasian Robin, the latter being the first who cultivated the locust tree in Europe.)

A genus of 8 species natives of the southern United States and Mexico.

1. A tree, with glabrous twigs, petioles, and pods; flowers white 1. *R. Pseudo-Acacia*
2. A shrub, with bristly twigs, petioles, and pods; flowers pink or purple 2. *R. hispida*

1. Robinia Pseudo-Acacia L. Sp. Pl. 722. 1753.

COMMON LOCUST, FALSE ACACIA

A tree 6–20 meters high with a trunk diameter of 2–4 dm.; bark nearly black, rough and deeply furrowed; twigs glabrous, with spines in pairs (stipules); leaves 12–25 cm. long; leaflets 11–15, ovate to oblong, 2–6 cm. long, 1–3 cm. wide, glabrous, margin entire, petiolules short; racemes slender, 9–20 cm. long, loose; flowers white, fragrant, about 2 cm. long; pod smooth, 6–12 cm. long, flat, brown 1.2 cm. wide. (*Pseúdo-Acácia*, false acacia.)

Along the mountains from Pennsylvania to Georgia and in the Ozark Mountains of Missouri, also in Arkansas and Oklahoma. Extensively planted as an ornamental tree and becoming more or less naturalized. Often spreading by means of underground stems and forming thickets of small trees. Perfectly hardy in Minnesota, but suffering greatly from the attacks of borers, and as a result usually short-lived.

The wood is brown or light green in color, close-grained, very hard and heavy and is very durable in contact with the soil, used to some extent as fence posts; weight about 45 lbs. Flowers in late May or June.

2. Robinia hispida L. Mant. 1: 101. 1767.

ROSE ACACIA, BRISTLY LOCUST

A much branched shrub, 1–3 meters high; branches, twigs and petioles bristly; leaves 10–20 cm. long; leaflets 9–15, ovate or orbicular, 2–5 cm. long, 2–3.5 cm. wide, rounded at the base, blunt at the apex and mucronate-tipped, glabrous above, pubescent on the veins beneath; racemes drooping, 6–10 cm. long; flowers large, deep rose color or purple, not fragrant, 2–3 cm. long; pod linear, bristly hispid, constricted between the seeds, 4–6 cm. long, brown. (*Híspida*, prickly.)

Native of the mountains from Virginia to eastern Tennessee and Georgia. Cultivated to some extent as an ornamental shrub, and reasonably hardy in the vicinity of the Twin Cities, though it sometimes kills back almost to the ground in severe winters. Flowers in June, fruit ripe in September.

5. CARAGANA Lam. Encycl. 1: 615. 1783.

PEA-TREE

Branching shrubs or small trees, with alternate, compound, even pinnate, often fascicled leaves; stipules sometimes spiny and persistent; flowers yel-

low, in few-flowered, umbel-like clusters or solitary, borne on short lateral spurs; calyx tubular, the two upper sepals smaller; standard with reflexed sides and long-clawed; wings oblique, elongated; keel short, blunt; pistil nearly sessile; ovules many; style straight or slightly bent; fruit a sessile, linear, at length cylindrical pod, about 2–5 cm. long, pointed; seeds oblong or nearly spherical. (*Caragána*, Tartar name of the original species.)

A genus of 20 species, distributed from southern Russia to China.

1. Low shrub with arching branches; leaves sessile, mostly in fascicles, usually subtended by 3 spines; leaflets oblanceolate or linear 1. *C. pygmaea*
2. Erect shrubs or small trees, 2–7 m. high; unarmed or with a pair of stipular spines at each node; leaves petioled; leaflets elliptic, oblong or obovate.
   a. Leaves digitately compound; leaflets 4, obovate; unarmed shrub 2. *C. frutescens*
   b. Leaves pinnately compound; leaflets 8–12, mostly elliptic; often with a pair of stipular spines at the nodes 3. *C. arborescens*

1. Caragana pygmaea DC. Prod. 2: 268. 1825.

DWARF RUSSIAN PEA-TREE

A low, spiny shrub with slender, arching branches; bark on older twigs dark gray and more or less shreddy; young twigs reddish brown, angled, more or less pubescent; leaves sessile, mostly in fascicles, generally subtended by 3 spines, formed from the persistent stipules and bristle-tipped rachis of the primary leaf of the node; leaflets 4, having the appearance of distinct leaves, oblanceolate or linear, 10–14 mm. long, 1–2 mm. wide, mucronate at the apex or sometimes blunt, sparingly pubescent or glabrous; flowers solitary in the leaf fascicles, bright yellow, 15–20 mm. long; calyx tubular-campanulate, pubescent or nearly glabrous, about 6 mm. long, the lobes triangular, with pubescent margins and mostly mucronate-tipped; pedicels pubescent, 5–10 mm. long, jointed at the middle; pod 2–2.5 cm. long, reddish brown, silky pubescent or nearly glabrous. (*Pygmáea*, dwarf, referring to the low stature.)

Native of central Asia. Sometimes planted as an ornamental shrub. Blossoms in May and June.

2. Caragana frutescens (L.) DC. Prod. 2: 268. 1825.

SHRUBBY PEA-TREE

C. digitata Lam. Encycl. 1763.
C. frutex (L.) K. Koch, 1869.*

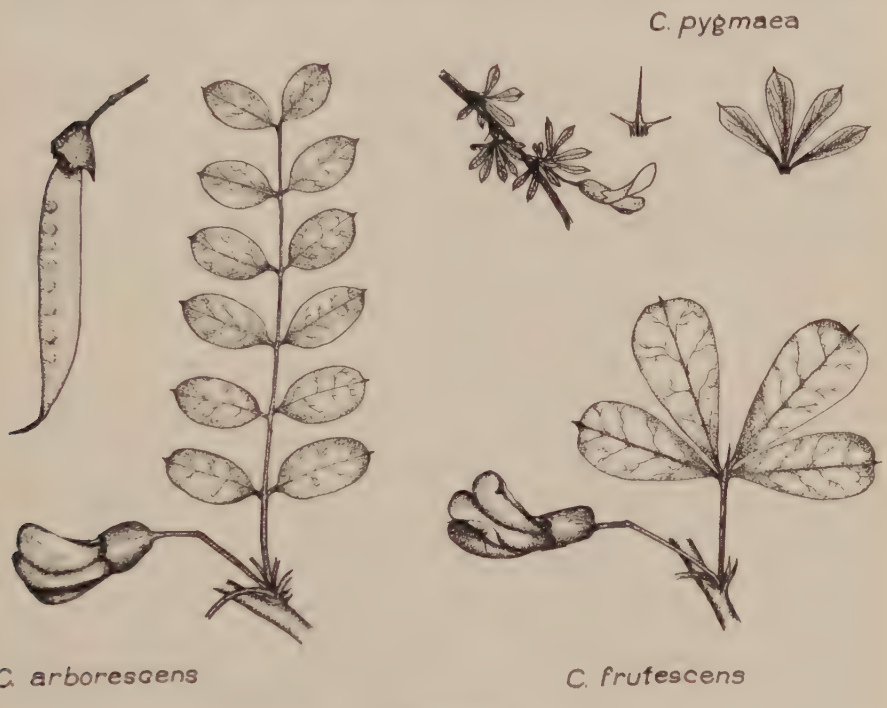
An unarmed shrub, 2–3 m. high, with long, erect branches; bark gray or brownish, more or less shreddy; young twigs greenish yellow, glabrous; leaves short-petioled, with 4 leaflets digitately arranged; rachis bristle-tipped; leaflets obovate 1–2.5 cm. long, 5–10 mm. wide, narrowed towards the base, rounded or emarginate at the apex and generally mucronate, bright green, glabrous on both sides; petioles 3–10 mm. long; stipules subulate, not hardening into spines; flowers solitary, bright yellow, about 2 cm. long; pedicels slender, 1.5–2.5 cm. long, jointed above the middle; calyx narrowly campanulate, about 5 mm. long, glabrous, somewhat gibbous at the base, the lobes broadly triangular, with pubescent margins and mucronate-tipped; pods about 3 mm. long. (*Frutéscens*, shrubby.)

From southern and southeastern Russia to northern China. Not as frequent in cultivation in the state as the Siberian pea-tree.

3. Caragana arborescens Lam. Encycl. 1: 615. 1783.

SIBERIAN PEA-TREE

An upright, branching shrub or small tree up to 6 m. high; bark of stem and branches gray; young twigs yellowish green, somewhat angled and sparingly pubescent; leaves 4–10 cm. long, with 8–12 pairs of leaflets; rachis bristle-tipped; leaflets elliptic to obovate, 1–3 cm. long, 6–15 mm. wide, rounded or narrowed at the base, rounded or acute at the apex and generally mucronate, at first more or less pubescent on both sides, later becoming quite glabrous or remaining pubescent mainly along the veins beneath; petiolules about 1 mm. long; stipules linear, generally spine-tipped and developing into a pair of stiff spines; flowers yellow, 1.5–2 cm. long, borne on slender,



CARAGANA

pubescent pedicels 2–5 cm. long, usually several from each bud of the previous season's wood; calyx tubular-campanulate, obscurely 5-toothed, with hairy margin; pods 3–5 cm. long, sharply pointed, brown and glabrous, their pedicels 3–6 cm. long and jointed a short distance below the persistent calyx. (*Arborēscens*, tree-like.)

Native of Siberia and Manchuria. Frequently cultivated in Minnesota and entirely hardy. Blossoms in May and June. Several varieties of the Siberian pea-tree are in cultivation. The following is most likely to be met with.

* The specific name *frutex*, which appears in the first edition of the *Species Plantarum*, was apparently a misprint, as Linnaeus changed it to *frutescens* in the second edition.

C. arborescens var. **pendula** Dipp. Laubh. 3: 710. 1893.

Tall growing, with strongly pendulous branches. (*Péndula*, drooping.)

RUTACEAE RUE FAMILY

Trees or shrubs, rarely herbs, with heavy-scented foliage dotted with translucent oil glands, and alternate or opposite mostly compound leaves; flowers perfect or unisexual; sepals 3–5 or 0, often more or less united; petals 3–5, free or rarely united; stamens as many as the petals and alternating with them, or twice as many as the petals, rarely numerous; carpels 1–5, rarely numerous, free or more or less united to form a compound pistil; ovary superior; ovules 1–many in each cell; receptacle growing out between the base of the stamens and the carpels to form an annular disk; fruit variable.

A family of about 110 genera and nearly 1,000 species, most abundant in the southern hemisphere. The citrus fruits belong in this family.

1. Leaves pinnately compound; twigs with stipular spines — 1. *Zanthoxylum*
2. Leaves trifoliolate; twigs not spiny — 2. *Ptelea*

1. ZANTHOXYLUM L. Sp. Pl. 270. 1753.

PRICKLY ASH

Trees or shrub with alternate, pinnately compound leaves; twigs with stipular spines; flowers small, in cymose clusters, either axillary or terminal, dioecious or polygamous, greenish or yellowish, small; sepals 3–5 or none; petals 3–5, imbricated; staminate flowers with 3–5 stamens alternating with the petals; pistillate flowers rarely with some stamens and 1–5 distinct stalked pistils, each with 2 ovules; fruit dehiscent, fleshy, 2-valved, 1–2-seeded. (*Zanthóxylum*, Gr. *Xanthos*, yellow, *xylon*, wood; the more usual and etymologically preferable spelling is *Xantholylum* but we here follow Linnaeus' original spelling.)

About 15 species, native of east Asia and North America. Only one species occurs in Minnesota.

1. Zanthoxylum americanum Mill. Gard. Dict. ed. 8. no. 2. 1768.

PRICKLY ASH

A prickly shrub 2–4 m. high, often forming dense thickets; leaves alternate, odd-pinnate, with 7–11 leaflets; rachis often with a few sharp prickles; leaflets 2–8 cm. long, 1–5 cm. wide, ovate, sessile, pinnately veined, apex rounded, narrowed, or minutely retuse, base rounded or narrowed, at first sparingly hirsute on both sides, in age becoming nearly glabrous above but

remaining hirsute beneath, rather thick and dotted with translucent oil glands, margin obscurely crenulate; flowers in small cymose axillary clusters, appearing before or with the leaves, greenish, dioecious; calyx lacking; fruit reddish brown when mature; seeds black, shining, about 3.5 mm. long. (*Americánum*, American.)

The foliage and fruit are filled with a pleasantly aromatic oil but are disagreeably pungent to the taste.

Frequent along edges of woodlands throughout the state except in the northeast Quebec to North Dakota, south to Virginia and Oklahoma.

ZANTHOXYLUM AMERICANUM

2. PTELEA L. Sp. Pl. 118. 1753.

HOP TREE

Shrubs or small trees without prickles and alternate 3–5-foliolate leaves; flowers greenish white, polygamous, in paniculate clusters; sepals 4–5,

slightly united below; petals 4–5, much longer than the calyx, imbricated; stamens 4–5, alternate with the petals; filaments hairy at the base, in the pistillate flower reduced to staminodes with small wrinkled anthers; carpels 2–3, united, inserted on a gynophore; pistil in the staminate flowers linear, sterile and with reduced stigma; ovary in the pistillate flower compressed, 2-celled and 2-winged, rarely 3-celled and 3-winged; each cell with 2 ovules; style short; stigma capitate, 2-lobed; fruit a broadly 2-winged (rarely 3-winged) samara, 2- (rarely 3-) celled, each cell with 1 seed. (*Ptélea*, Gr. name for the elm, so called from the similarity in the fruits.)

A genus of 3 North American species; only the following is found in Minnesota.

PTELEA TRIFOLIATA

1. Ptelea trifoliata L. Sp. Pl. 118. 1753.

HOP TREE

A small tree or large shrub up to 6 m. high and with a trunk diameter of 5–15 cm.; bark of trunk dark reddish brown, smooth except for small irregular lines of exfoliating cork; twigs glabrous, soon becoming dark red-brown; leaves trifoliolate, with petioles 3–12 cm. long; stipules wanting; leaflets nearly sessile, the middle leaflet obovate or lance-ovate, base long attenuate, apex acute or acuminate, 5–15 cm. long, 2.5–9 cm. wide, the lateral leaflets somewhat smaller, inequilateral elliptic-ovate, the base much more abruptly narrowed than in the middle leaflet, sometimes rounded, apex mostly acute, surface of leaflets pubescent when young, usually becoming nearly or quite glabrous before they are full-grown, dark green and glossy above, paler beneath, margins crenulate; foliage marked with small, rounded, translucent oil glands; flowers small, greenish, appearing after the leaves, in terminal compound clusters; samaras nearly orbicular, 2–3 cm. in diameter, glabrous, veiny, mostly 2-seeded, borne on slender pedicels, 1–2 cm. long. (*Trifoliáta*, three-leaved, referring to the trifoliolate leaves.)

Occasionally planted as an ornamental shrub in Minnesota and escaping and becoming established in the vicinity of Minneapolis and possibly elsewhere. While the range of this plant is commonly given to include Minnesota, there is no evidence that it occurs native anywhere in the state. New York to Michigan, Illinois, and Kansas, south to Florida, Texas, and Mexico.

The foliage and fruit have a strong disagreeable odor when crushed. The bark and fruit are bitter. Wood hard, close-grained, bright yellow.

EMPETRACEAE CROWBERRY FAMILY

Low, evergreen, heath-like shrubs; leaves small, narrow, sessile, channeled on the lower side; flowers small, dioecious or monoecious, rarely polygamous or perfect, axillary or in terminal heads; sepals 2–3, petals 2–3, or 0; staminate flowers with 2–4 stamens, filaments slender, sometimes with a rudimentary pistil; pistillate flowers with 2–several-celled ovary, styles 2–several; fruit a berry-like drupe containing 2–several 1-seeded nutlets.

A family of three genera and five species, the other two genera occurring in eastern North America, one of them also in western Spain, Portugal, and the Azores. The family is probably an apetalous off-shoot from the *Ericaceae*.

1. EMPETRUM L. Sp. Pl. 1022. 1753.

CROWBERRY

Low, spreading, freely branching shrub with the aspect of a heath; flowers dioecious or monoecious, rarely perfect, purplish, scattered and solitary in the axils of the leaves, scaly bracted, inconspicuous; calyx of 3 somewhat petal-like, spreading sepals; petals 3; stamens 3 exserted; styles short, stigma 6–9-lobed; fruit a berry-like drupe, black or red, with 6–9 seed-like nutlets. (*Empétrum*, Gr., upon a rock.)

A genus of two species, the following, and one in Tierra del Fuego, the Falkland Islands, and Tristan da Cunha.

1. Empetrum nigrum L. Sp. Pl. 1022. 1753.

CROWBERRY

Much branched, branches diffusely spreading, glabrous or puberulous, 6–25 cm. long; leaves crowded, linear oblong, 4–7 mm. long, 1–1.5 mm. wide, thick, glabrous or slightly puberulent, margin revolute, apex obtuse; fruit black, 4–6 mm. in diameter. (*Nígrum*, black.)

In rocky places, Greenland to Alaska, south to the coast of Maine, the mountains of northern New England and New York, Isle Royale, and the coast of southern California, also northern Eurasia and Chile (var. *andinum*, which, however, occurs also in North America). There are no Minnesota specimens in the herbarium of the University of Minnesota but it has been collected on Isle Royale and is almost sure to occur on the north shore of Lake Superior.

ANACARDIACEAE SUMAC FAMILY

Trees or shrubs with acrid, resinous or milky sap; leaves alternate, rarely opposite, simple or compound; flowers small, regular, perfect or polygamous; calyx 3–5-cleft; petals 3–7, imbricated in the bud, sometimes lacking; stamens as many or twice as many as the petals, inserted along the edge of a rounded disk; ovary 1–5-celled; styles 1–3; ovule one in each cavity; fruit mostly a small drupe; seed coat crustaceous or bony.

A family of about 60 genera and 500 species, most abundant in warm and tropical regions, a few extending into the temperate zone.

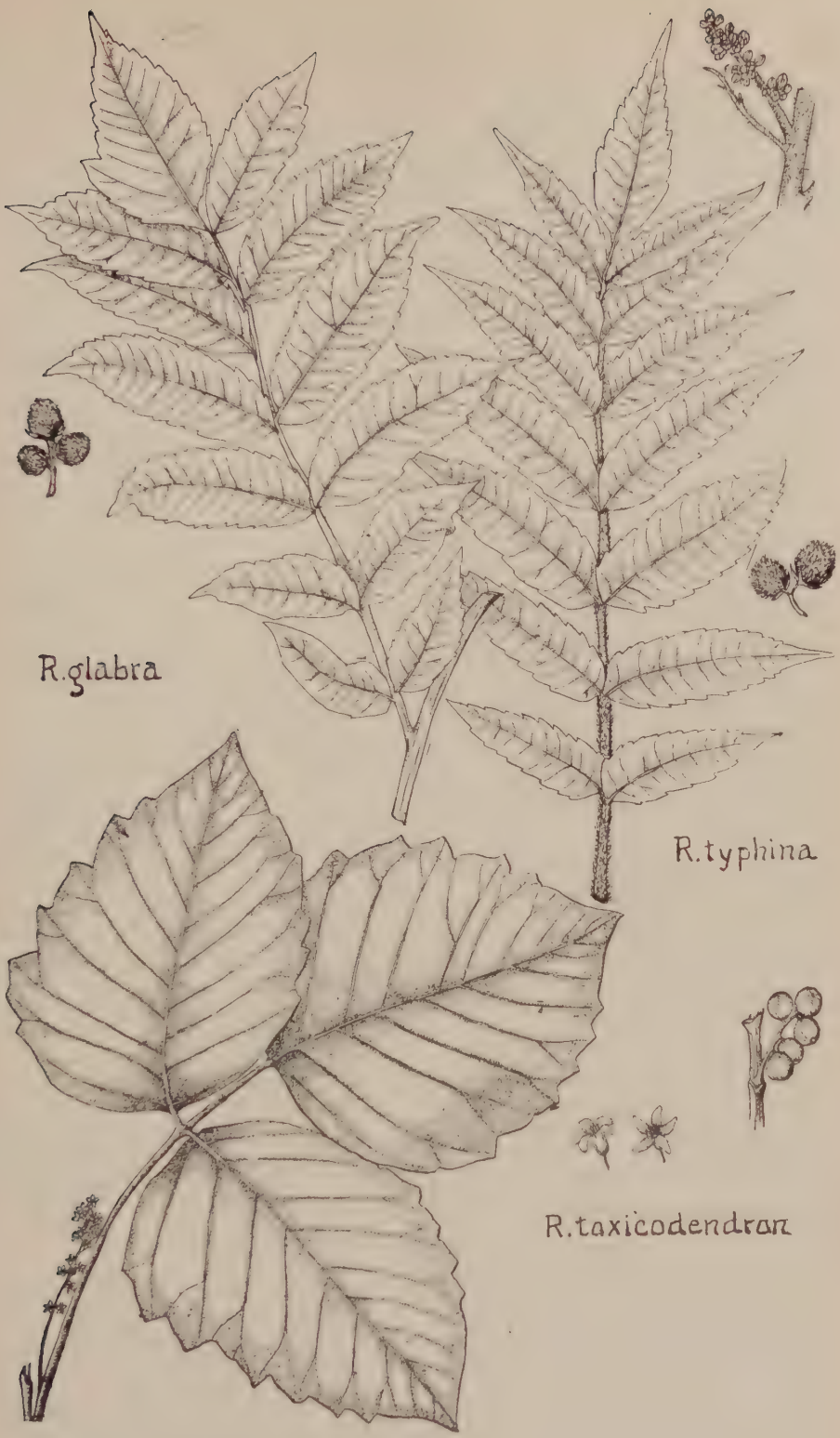
1. Leaves compound; fruit clusters with numerous fruits and no elongated plumose sterile pedicels ..... 1. *Rhus*
2. Leaves simple; fruit clusters a mass of elongated, plumose, sterile pedicels with a few scattered fruits ..... 2. *Cotinus*

1. RHUS L. Sp. Pl. 265. 1753.

SUMAC

Shrubs or trees with alternate, compound or simple leaves; stipules none; flowers in axillary or terminal panicles, greenish white or yellow, small, polygamous; calyx 5-cleft or 5-parted; petals 5, spreading; stamens 5, inserted between the lobes of the disk; ovary 1-celled, ovule solitary, styles 3; fruit a kind of drupe, small, 1-seeded. (*Rhús*, Gr. *rhous*, sumac.)

A genus of about 120 species, natives of warm and temperate regions. The greatest number of species occur in South Africa. In addition to the following, about 12 more species occur in the eastern, southern, and western parts of the United States.



Rhus (×⅔)

1. Leaves pinnate (in cut-leaf forms bipinnatified to bipinnate), leaflets more than 3.
   a. Leaflets serrate to deeply dissected or compound; fruit with crimson hairs; stone smooth.
      (1) Twigs and petioles villous-hirsute.
         (a) Leaflets serrate — 1. *R. typhina*
         (b) Leaflets deeply dissected or compound (cut-leaf) — 1a. *R. typhina* f. *dissecta*
      (2) Twigs and petioles glabrous.
         (a) Leaflets serrate — 2. *R. glabra*
         (b) Leaflets deeply dissected or compound (cut-leaf) — 2a. *R. glabra* f. *laciniata*
   b. Leaflets entire; fruit grayish white; stone striate — 3. *R. Vernix*
2. Leaves trifoliolate.
   a. Terminal leaflet long-stalked; flowers greenish, in loose clusters, appearing after the leaves — 4. *R. Toxicodendron*
   b. Terminal leaflet sessile; flowers yellow, in dense clusters, appearing before the leaves — 5. *R. canadensis*

1. Rhus typhina L. Amoen. Acad. 4: 311. 1760.

STAGHORN SUMAC

Rhus hirta Sudw. 1892.

A shrub or sometimes a small tree reaching a height of 10 m., more commonly 3–4 m.; bark smooth and gray; twigs densely velvety hairy; leaves odd-pinnate; petioles pubescent, 15–30 cm. long; leaflets 11–31, oblong-lanceolate, 4–14 cm. long, 1.5–4.5 cm. broad, rounded at the base, acuminate at the apex, sharply and sometimes coarsely serrate, dark green and nearly glabrous above, paler and pubescent beneath, sessile; panicles terminal, dense-flowered, 9–12 cm. long; flowers yellowish green, polygamous, 5–6 mm. broad; drupe globose, about 4 mm. in diameter, thickly covered with bright crimson, straight hairs. (*Typhina*, smoky.)

In dry, rocky soil. Occurs in the eastern part of the state from the southern boundary northward to the Canadian border, extending west into the Big Woods and to Martin County. Common in Pine County and westward to Mille Lacs and to Cass County. Distributed from eastern Quebec to Southern Georgia, west to Minnesota, Missouri, and Mississippi. The wood is soft, greenish yellow, weighing 27 lbs. The bark is rich in tannin.

1a. R. typhina f. dissecta Rehder, Rhodora, 9: 115. 1907.

CUT-LEAF SUMAC

With leaves bipinnatified to bipinnate; frequently planted as an ornamental shrub. (*Dissécta*, dissected.)

2. Rhus glabra L. Sp. Pl. 265. 1753.

SCARLET SUMAC, UPLAND SUMAC

A shrub or very rarely a small tree, 0.5–6 m. high; bark smooth and grayish; twigs glabrous and somewhat glaucous; petioles often purplish,

glabrous; leaflets 11–31, oblong-lanceolate, rounded and slightly oblique at the base, acuminate at the apex, sharply serrate, dark green and often shining above, paler beneath, glabrous throughout, 4–10 cm. long, 1.5–3 cm. wide; panicles many-flowered, about 8–10 cm. long, puberulent when young; flowers small, greenish, about 5 mm. broad; drupe globose, 3–4 mm. in diameter, covered with short, reddish, acid hairs. (*Glábra*, smooth.)

In dry soil, common throughout the state, less common than *R. typhina* in the Big Wood region. Distributed from central Maine to British Columbia, south to Florida, Mississippi, and Arizona. The leaves are sometimes used for tanning. This species, like the preceding often has the whole or a part of the inflorescence changed into clusters of small leaves.

RHUS VERNIX (×½)

2a. R. glabra f. **laciniata** (Carr.) Robinson, Rhodora, 10: 35. 1908.

With leaves that are laciniately bipinnatifid to bipinnate; planted as an ornamental shrub. (*Laciniáta*, torn, referring to the deeply cut margin of the leaflets.)

3. Rhus Vernix L. Sp. Pl. 265. 1753.

POISON SUMAC, POISON OAK

A shrub or small tree, sometimes reaching a height of 8 m., more commonly 2–4 m. high; bark gray; twigs greenish; leaves petioled, pinnate,

15–36 cm. long; leaflets 7–13, obovate or oval, or the lowermost ovate, narrowed or rounded at the base, acute or acuminate at the apex, entire, green on both sides, glabrous or slightly puberulent, 4–14 cm. long, 1.5–6 cm. wide; panicles axillary, numerous, long-peduncled, 10–17 cm. long; flowers green, very small, about 2 mm. broad; fruit yellowish green, smooth and shining, about 4 mm. in diameter. (*Vérnix*, varnish.)

In swamps, reported from Houston and Winona counties, frequent in Hennepin, Ramsey, and Anoka counties and along the upper Mississippi. Distributed from western Maine to western Ontario and Minnesota, south to Florida, Mississippi, and Louisiana.

This species is said to be much more poisonous than the poison ivy and should be avoided. Blossoms in May, fruit ripe in August.

4. Rhus Toxicodendron L. Sp. Pl. 266. 1753.

POISON IVY

A low, erect or suberect shrub, 2–6 dm. high, from creeping rhizomes; bark on older stems gray; young twigs yellowish or brownish green, more or less pubescent and dotted with numerous small dark lenticels; leaves pinnately trifoliolate; leaflets 5–14 cm. long, 4–10 cm. wide, ovate to rhombic, the lower ones often somewhat inequilateral, rounded at the base, acuminate at the apex or sometimes blunt, margin entire, crenulate or irregularly and coarsely few-toothed, dark green, shining, and mostly glabrous above, somewhat paler and more or less bristly pubescent especially along the veins beneath; petioles 5–25 cm. long, petiolule of the terminal leaflet 12–25 mm. long, those of the lateral leaflets 3–6 mm. long, all more or less pubescent; flowers greenish, polygamo-dioecious, in panicles, the panicles of the staminate flowers more ample than those of the pistillate; staminate flowers larger than the pistillate, with conspicuous stamens; pistillate flowers with abortive stamens not exceeding the pistil; fruit globose, with shallow, longitudinal grooves, yellowish white, smooth and shining, about 5 mm. in diameter, persisting through the winter. (*Toxicodéndron*, poison tree.)

Abundant in thickets, woods, hedgerows, and along roadsides. Common throughout the state. Nova Scotia to British Columbia, south to Florida, Arkansas, and Utah.

The plant is very poisonous to the touch and causes serious inflammation of the skin. The irritation is caused by an oleo-resin found in all parts of the plant and secreted by the leaves and bark. While some persons are much less sensitive to the poison than others, no one should handle the plants carelessly because of assumed immunity.

4a. R. Toxicodendron var. **radicans** (L.) Torr. Fl. U. S. 324. 1824.

Distinguished from the preceding by the climbing habit, sometimes ascending high into trees by means of roots, which attach themselves to the bark. The stem sometimes attains a diameter of 3–6 cm. (*Rádicans*, rooting.)

In woods, thickets, and along roadsides in the southeastern part of the state.

5. Rhus canadensis Marsh. Arb. Am. 129. 1785.

SWEET-SCENTED SUMAC

A shrub 1–2.5 m. high with ascending or spreading branches; young twigs more or less pubescent, older twigs glabrous, brown or reddish brown and dotted with small round lenticels; leaves trifoliolate, with petioles 1–3 cm. long; terminal leaflet rhombic-ovate, rarely obovate, 3.5–7.5 cm. long, 2.5–4.5 cm. wide, narrowed at the base, acute at the apex, sessile or slightly stalked; lateral leaflets somewhat smaller, sessile, rounded and generally inequilateral at the base, short acute or rounded at the apex, all crenate or crenate-dentate, pubescent on both sides, especially when young, bristly hairy along the margin, becoming glabrate with age; flowers yellow, appearing before the leaves in clustered spikes 1–1.5 cm. long (the inflorescence catkin-like before flowering); bracts dark reddish brown, with bristly ciliate margins; sepals ovate, scale-like, about 1 mm. long; petals elliptic or ovate, 2–2.5 mm. long; stamens included; drupe globose, red, pubescent, 6–8 mm. in diameter. (*Canadénsis*, Canadian.)

On dry, rocky banks. Vermont to Illinois, south to Florida, Louisiana, and Kansas. The reports in various floras of the occurrence of this species in Minnesota have not been verified by authentic collections so far as the writers have been able to ascertain. Occasionally planted as an ornamental shrub.

2. COTINUS Adans. Fam. 2: 345. 1763.

SMOKE TREE

Shrubs or small trees with alternate, petioled, ovate, elliptical or obovate, entire, simple leaves; flowers in large terminal panicles, polygamous, yellowish; calyx 5-cleft; sepals lance-ovate, imbricated; petals 5, oblong, about twice as long as the sepals; stamens 5, shorter than the petals; ovary superior, with 3 short lateral styles; stigmas small; fruit an obliquely ovoid drupe, somewhat compressed, 1-seeded; the fruiting panicles with few fruits and the numerous pedicels of the sterile flowers much elongated and plumose. (*Cotínus*, Greek name for the wild olive.)

A genus of two species, one of southeastern United States, the other of southern Europe and Asia.

Cotinus coggygria Scop. Fl. Carn. ed. 2. 1: 220. 1772.

SMOKE TREE

A shrub up to 5 m. high; leaves elliptic to obovate, 3–8 cm. long, rounded or slightly notched at the apex, and either rounded or somewhat narrowed at the base, margin entire, glabrous on both surfaces; petiole mostly 1–1.5 cm. long; fruiting panicles dull purple, very conspicuous, appearing like clouds of smoke, whence the common name of the plant. (*Coggýgria*, name unexplained.)

Occasionally planted as an ornamental shrub on account of its conspicuous fruiting panicles. Moderately hardy in the latitude of the Twin Cities.

AQUIFOLIACEAE HOLLY FAMILY

Trees or shrubs with watery sap; leaves simple, alternate, petioled, often leathery in texture; flowers in axillary clusters or borne singly, small, regular,

white or greenish, mostly polygamo-dioecious; calyx 3–6-parted, generally persistent; petals 4–6 or sometimes more, separate or slightly united at the base, deciduous; stamens hypogynous, as many as the petals or more; anthers cordate; disk lacking; ovary superior, 3–several-celled; style short or none; ovules 1–2 in each cavity of the ovary; fruit a small berry-like drupe enclosing several nutlets.

A family of five genera and nearly 300 species of temperate and tropical regions.

1. Leaves serrate, prominently veined, pubescent beneath; flowers on very short pedicels 1. *Ilex*
2. Leaves entire, inconspicuously veined, glabrous; flowers on slender, elongated pedicels 2. *Nemopanthus*

ILEX VERTICILLATA

1. ILEX L. Sp. Pl. 125. 1753.

HOLLY

Shrubs or trees; leaves alternate, entire or dentate or spiny-toothed, sometimes leathery; stipules minute; flowers axillary, cymose or solitary, perfect or polygamous; calyx small, 4–6-toothed; petals 4–6, separate or

united only at the base, oval or obovate, spreading; stamens as many as the petals and attached to their base; fruit a berry-like drupe containing 4–6 nutlets. (*Ilex*, classical Latin name of the holly oak.)

A genus of about 280 species, mostly natives of America, some in the Old World. In addition to the following, about 12 species occur in the eastern and southeastern parts of the United States.

Ilex verticillata (L.) Gray, Man. Bot. ed. 2. 264. 1856.

VIRGINIA WINTER-BERRY, BLACK ALDER

A shrub 1–6 m. high, with a smooth grayish bark; twigs glabrous or slightly pubescent; leaves oval, obovate, or oblong-lanceolate, 4–11 cm. long, 1.5–4 cm. wide, acute at the base, acute or acuminate at the apex, serrate, dark green and nearly glabrous above, pubescent at least on the veins beneath; petioles 8–12 mm. long; flowers mostly crowded; pedicels about 3 mm. long; sepals ciliate on the margins; petals spreading or reflexed; fruit a bright red drupe, 6–7 mm. in diameter. (*Verticillata*, in whorls.)

Common in swamps throughout the northern and northeastern parts of the state, and occasionally as far south as Fillmore County. Distributed from Nova Scotia to Florida, west to western Ontario, Minnesota, and Missouri. Blossoms in June, fruit ripe in September.

2. NEMOPANTHUS Raf. Journ. Phys. 89: 96. 1819.

MOUNTAIN HOLLY

A much branched shrub with ash-gray bark and alternate, deciduous, mostly entire leaves; flowers greenish yellow, on long, slender, axillary pedicels, polygamo-dioecious; sepals 4–5, subulate, minute and generally early deciduous; petal 4–5, oblong-linear, spreading, distinct; stamens 4–5; filaments slender; anthers ovoid; ovary 3–5-celled, with 1 ovule in each cell; stigmas 3–5, sessile; fruit a subglobose drupe with 3–5 bony nutlets. (*Nemopánthus*, said to mean a flower with a filiform peduncle.)

A monotypic genus of eastern North America.

Nemopanthus mucronata (L.) Trelease, Trans. Acad. St. Louis, 5: 349. 1898.

MOUNTAIN HOLLY

A shrub 1.5–4 m. high with ash-colored bark; buds short and broadly conical; young twigs dark reddish brown, glabrous, generally with many small, light-colored lenticels; leaves elliptic to elliptic-oblong or sometimes ovate, 2–5 cm. long, 1–2.5 cm. wide, rounded or narrowed at the base, rounded and mucronate at the apex or occasionally acute, entire or with a few minute teeth, glabrous on both sides, somewhat paler beneath; petioles

5–12 mm. long; both staminate and pistillate flowers solitary in the axils of the leaves or the staminate sometimes 2–4 together; pedicels very slender, 1–3 cm. long; drupe red, 6–8 mm. long; nutlets slightly ridged. (*Mucronáta*, referring to the mucronate-tipped leaves.)

Infrequent in swamps from Lake Pepin northward and northwestward. Newfoundland to Minnesota, south to Virginia and Indiana.

Blossoms in May and June, fruit ripe in August and September.

NEMOPANTHUS MUCRONATA

CELASTRACEAE BITTERSWEET FAMILY

Shrubs or twining woody vines with simple, alternate or opposite leaves; flowers small, regular, in cymes or racemes; sepals 4–5, more or less united; petals 4–5, stamens 4–5, alternate with the petals, borne on a fleshy disk, which fills the bottom of the calyx; ovary 3–5-celled; fruit fleshy, dehiscent; seeds arilled, remaining on till late in the winter.

A family of about 45 genera and 430 species, widely distributed in warm and temperate regions.

1. Shrub with opposite leaves; flowers in cymes; fruit lobed — 1. *Evonymus*
2. Twining vine; leaves alternate; flowers in racemes — 2. *Celastrus*

1. EVONYMUS L. Sp. Pl. 197. 1753.

SPINDLE TREE

Shrubs with opposite, simple, petioled, serrate leaves; branchlets four-sided; cymes axillary, several-flowered, 4–6 cm. long, borne on the season's

growth; flowers flat, 7–10 mm. wide; sepals 4–5, united at the base; petals 4–5, rounded, spreading, about 3 mm. long; stamens 4–5, usually borne on the top of a flat disk which adheres to the calyx; ovary 3–5-celled; fruit 3–5-lobed, loculicidal; seeds 1–3 in each cell. (*Evónymus*, classical name for the spindle tree, often spelled *Euonymus*. We follow Linnaeus' spelling.)

EVONYMUS ATROPURPUREA CELASTRUS SCANDENS

A genus of 70 species, of the north temperate zone. Besides the first of the following described species, two occur in eastern North America and two in California.

1. Petals dark purplish brown, anthers sessile, aril scarlet; leaves elliptical, more or less pubescent over whole lower surface 1. *E. atropurpurea*
2. Petals yellowish green, anthers with distinct filaments, aril orange; leaves ovate-lanceolate, glabrous or hispid pubescent along the veins only 2. *E. europaea*

A genus of about eight species of the north temperate zone, two of which are native of North America.

Staphylea trifolia L. Sp. Pl. 270. 1753.

AMERICAN BLADDER-NUT

A shrub 1–3 m. high, with grayish bark; branches greenish and striped; leaves long-petioled, trifoliolate; leaflets ovate to obovate, 4–10 cm. long,

STAPHYLEA TRIFOLIA

2–6 cm. wide, the terminal leaflet slightly larger than the lateral ones, narrowed at the base, acuminate at the apex, finely serrate, smooth above, pubescent at least along the veins beneath; racemes 3–6 cm. long, flowers 8–10 mm. long; fruit an inflated capsule 2–3 cm. in diameter. (*Trifólia*, three-leaved, in reference to the three leaflets of the compound leaf.)

Frequent in moist thickets and ravines in the southern part of the state, as far north as White Bear Lake and west as far as New Ulm. Distributed from western Quebec and western New England, west to Minnesota, and south to South Carolina and Missouri. Blossoms in May, fruit ripe July–August.

ACERACEAE MAPLE FAMILY

Trees or shrubs with watery, often sugary sap; leaves opposite, simple or palmately lobed or more rarely palmately or pinnately 3–15-foliolate; flowers in axillary or terminal cymes, clusters or racemes, polygamous or dioecious, regular; calyx mostly 4–5-parted, petals 4–5 or none; disk thick, round or lobed, sometimes wanting; stamens 4–12, mostly 8; ovary 2-celled, 2-lobed; styles 2, from between the lobes; fruit 2 long-winged samaras united at the base, each 1-seeded; cotyledons rolled up in the seed.

The family consists of two genera, *Acer* and *Dipteronia*. The latter differs from *Acer* in the samara being winged all around.

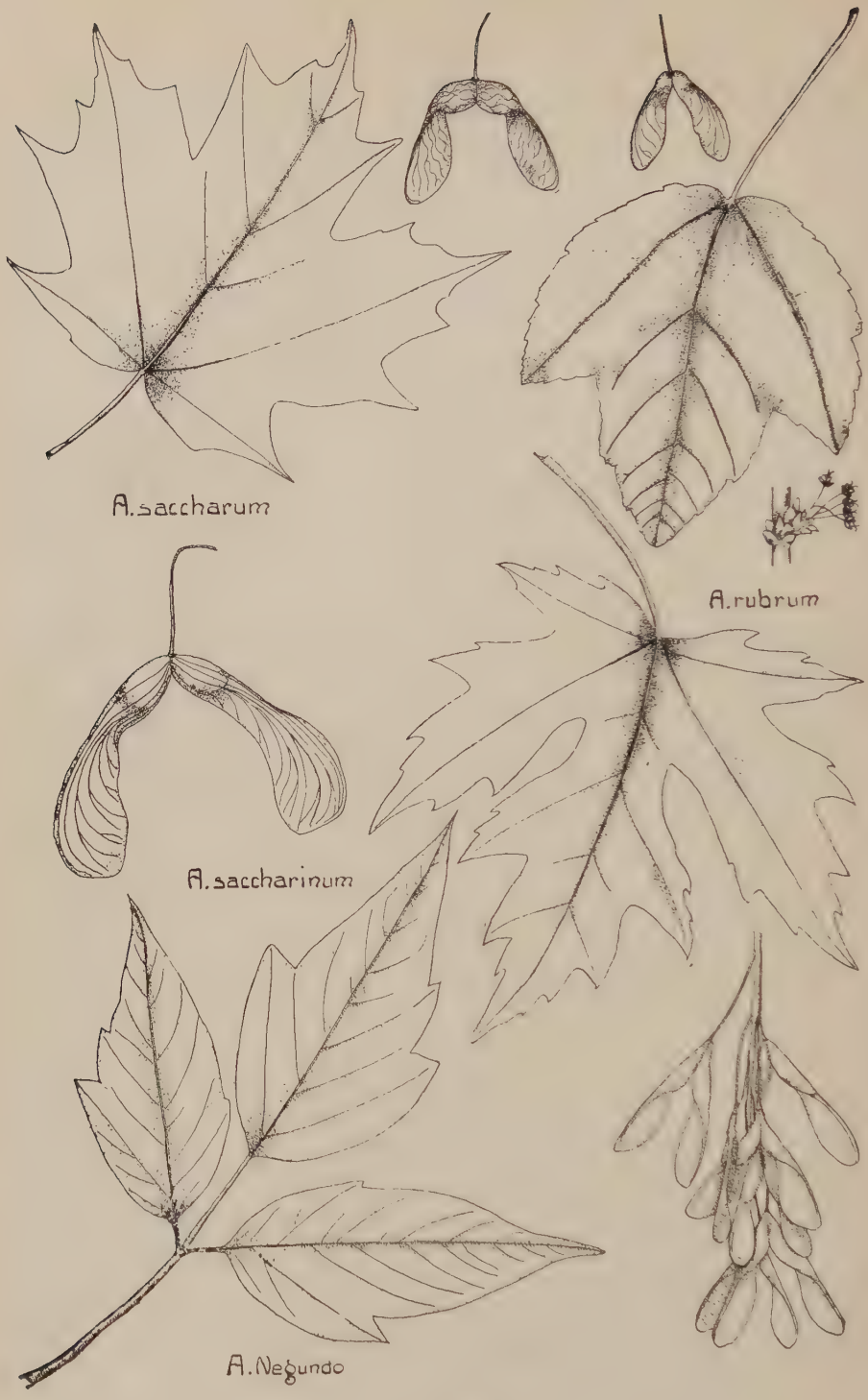
ACER L. Sp. Pl. 1055. 1753.

MAPLE

Samaras winged on one side only, otherwise as in the family description. (*Acer*, the classical Latin name for the maple.)

A genus of about 115 species, natives of the north temperate zone.

1. Leaves simple; flowers polygamous.
   a. Flowers appearing much before the leaves in dense clusters from separate buds; fruits borne in leafless clusters on the older twigs.
      (1) Flowers sessile or short-stalked; petals lacking; middle lobe of leaf rhombic, narrowed at the base 1. *A. saccharinum*
      (2) Flowers on long pedicels; petals present; middle lobe of leaf triangular, broadest at the base 2. *A. rubrum*
   b. Flowers appearing with or after the leaves; clusters of fruit borne on leafy shoots of the season's growth.
      (1) Leaves pinnately veined, unlobed or obscurely and irregularly pinnately lobed 3. *A. tataricum*
      (2) Leaves palmately veined, palmately 3–7-lobed.
         (a) Leaves with serrate margins; flowers appearing after the leaves; samaras 2–2.5 cm. long, their wings close together and only slightly divergent.
            m. Leaves almost as wide as long, middle lobe triangular, flowers in slender, upright racemes (native) 4. *A. spicatum*
            n. Leaves much longer than wide, middle lobe oblong to lanceolate, elongated; flowers in corymbs (introduced) 5. *A. ginnala*
         (b) Leaves with coarsely dentate, undulate-dentate, or entire margins; flowers appearing with the leaves; samaras mostly 3–5 cm. long, wings moderately to widely spreading.
            m. Flowers in sessile umbel-like corymbs, drooping; pedicels hairy; petals absent; samaras about 3 cm. long, their wings moderately spreading.



ACER (×⅔)

x. Leaves with deep lobing, pale and nearly glabrous beneath; sinus at the base open or shallow; petioles glabrous 6. *A. saccharum*

y. Leaves with shallow lobing, sinus at the base closed; green and pubescent along the veins beneath; petioles pubescent 7. *A. nigrum*

n. Flowers in terminal corymbs; petals present; pedicels glabrous; samaras 4–5 cm. long, their wings nearly horizontally spreading 8. *A. platanoides*

2. Leaves compound; flowers dioecious 9. *A. Negundo*

1. Acer saccharinum L. Sp. Pl. 1055. 1753.

SOFT MAPLE, SILVER MAPLE

A large tree attaining a height of 33 m. and a trunk diameter of 10–14 dm., usually branched into 3–4 secondary stems; bark furrowed, the surface separating into scales, reddish brown, bark of secondary stems and large branches smooth and gray; leaves deeply 5-lobed, with narrow sinuses, 7–16 cm. long, 6–14 cm. wide, truncate or slightly heart-shaped at the base, lobes remotely and irregularly serrate, upper surface green and glabrous, lower surface silvery white and more or less pubescent at least when young; petioles 5–12 cm. long; flowers yellowish red, in nearly sessile, lateral clusters, appearing many days before the leaves, the staminate and pistillate in separate clusters, sometimes on the same tree, sometimes on different ones; calyx slightly 5-lobed; petals lacking; stamens 5–7, exceeding the calyx in the staminate flowers; samaras spreading, pubescent when young, about 5 cm. long, wings 12–14 mm. wide. (*Saccharínum*, sugary.)

Along streams and riverbanks, common southward and occurring scattered northward to the upper Mississippi, Vermillion Lake, etc. Distributed from New Brunswick to Florida, west to Dakota, Nebraska, and Oklahoma. Very extensively planted as a shade and ornamental tree. The wood is light brown in color, close-grained, strong and hard, weighing 33 lbs. It is easily worked and is used for furniture and for floors. Sugar is made to a slight extent from the sap. Blossoms in March and April, fruit ripe in June.

Among the more commonly cultivated forms of this species is the cut-leaf maple, *A. Saccharinum* var. *laciniatum* Pax, 1901, more familiarly known in the trade as *A. dasycarpum* var. *Wieri* Schwerin., distinguished by pendulous branches, and deeply cleft leaves with dissected lobes.

2. Acer rubrum L. Sp. Pl. 1055. 1753.

RED MAPLE, SWAMP MAPLE

A medium-sized, slender tree, 6–20 m. high with a trunk diameter of 1–4 dm.; bark of the stem gray, separating into flaky ridges; twigs dark red and lustrous; leaves sharply 3–5-lobed, 5–12 cm. long, 6–12 cm. wide, cordate or truncate at the base, lobes acuminate, irregularly serrate or toothed, green and glabrous above, paler and tomentose at least along the veins be-

Acer spicatum

neath; petioles 3–8 cm. long; flowers monoecious or dioecious, crimson or yellowish, in lateral sessile clusters, appearing long before the leaves; petals present, linear-oblong; stamens 3–7, in the pistillate flowers much reduced; fruits on drooping pedicels, glabrous; samaras slightly spreading, about 3 cm. long, 8–9 mm. wide. (*Rúbrum*, red.)

In swamps and moist woods, abundant in the eastern part of the state from the north as far south as Winona, west to the White Earth Indian Reservation and Redwood Falls. Distributed from Newfoundland to northwestern Minnesota, south to Florida and Texas.

The wood is light brown in color, close-grained, heavy but not strong, weighing 39 lbs. It is used in the manufacture of furniture. The bark is sometimes used in dyeing. Blossoms in March and April, fruit ripe in June.

3. Acer tataricum L. Sp. Pl. 1054. 1753.

TARTARIAN MAPLE

A small tree, 6–8 m. high; leaves ovate, 5–8 cm. long, 3–5 cm. wide, slightly cordate at the base, acute or acuminate at the apex, doubly and irregularly serrate or sometimes obscurely lobed, glabrous above, sometimes pubescent along the veins beneath; panicles narrow, erect or ascending, 6–8 cm. long; flowers whitish, 6–7 mm. broad; samaras slightly spreading, 3.5–4.5 cm. long, wings 10–12 mm. wide. (*Tatáricum*, of Tartary.)

Frequently cultivated as an ornamental tree and perfectly hardy, native of southeastern Europe. Blossoms in May, fruit ripe in August and September.

4. Acer spicatum Lam. Encycl. 2: 381. 1786.

MOUNTAIN MAPLE

A shrub 2–4 m. high, very rarely a small tree; bark green or greenish; leaves mostly 3- (rarely 5-) lobed, 6–12 cm. long, 5–10 cm. wide, coarsely serrate, cordate at the base, lobes acute or taper-pointed, glabrate above, pubescent beneath; petioles 3–10 cm. long; inflorescence a raceme or narrow panicle, 7–10 cm. long; flowers greenish yellow, 6–8 mm. broad; samaras 2–2.5 cm. long, wings slightly divergent, 7–8 mm. wide. (*Spicátum*, in spikes.)

Moist or damp, rocky woods, abundant in the northern and northeastern part of the state, infrequent and local southward to Winona and Houston counties. Distributed from Newfoundland and Labrador to Hudson Bay and Manitoba, south to New England, New York, the Great Lakes, northeastern Iowa, and the mountains of Georgia. The wood is soft, light reddish brown and weighs 33 lbs. Blossoms in May and June, fruit ripe in August and September.

5. Acer ginnala Maxim. Bull. Phys. Math. Acad. Petersb. 15: 126. 1857.

SIBERIAN MAPLE

A graceful small tree or shrub up to 6 m. high; young twigs slender, yellowish brown, somewhat angled, glabrous; leaves much longer than wide, 3–8 cm. long,

mostly 3-lobed, rarely 5-lobed, rounded or truncate at the base, acuminate at the apex, middle lobe oblong or sometimes narrowed at the base and ovate-oblong, lateral lobes spreading and much shorter than the middle lobe, triangular or sometimes lanceolate, margin sharply and irregularly serrate, bright green and glabrous above, sparingly pubescent beneath, becoming nearly or quite glabrous with age, turning a brilliant red in autumn; petioles slender, 3–4 cm. long; flowers in terminal corymbs, yellowish white; sepals and petals oblong; style elongated; samaras about 2.5 cm. long, with slightly divergent wings. (*Ginnála*, the vernacular name for the plant where it occurs native.)

Occasionally planted and apparently entirely hardy in our climate. Native of northeastern Asia and Japan. Flowers in May and June, fruit ripe in July and August.

6. **Acer saccharum** Marsh. Arb. Am. 4. 1785.

SUGAR MAPLE, HARD MAPLE

A large, handsome tree, attaining a height of 30–40 m. and a trunk diameter of 6–12 dm.; bark of trunk furrowed and rough, grayish brown, separating into scales, the bark of branches and young trees smooth and pale gray, sometimes with whitish blotches; leaves 3–5-lobed, 5–16 cm. long, 6–20 cm. broad, cordate, truncate or cuneate at the base, with rounded sinuses and pointed, sparingly sinuate-toothed lobes, glabrous and dark green above, brighter beneath and slightly hairy in the axils of the veins; petioles 4–10 cm. long; flowers in umbellate, drooping clusters, from terminal leaf-bearing, and lateral leafless buds; pedicels long and very slender, hairy; calyx campanulate, greenish yellow; sepals hairy at the apex, about 4 mm. long; petals none; stamens in the staminate flowers twice as long as the calyx, in the pistillate flower shorter than the calyx; samaras slightly spreading, 2.5–3.5 cm. long, wings 8 mm. wide. (*Sacchárum*, sugar.)

In rich woods, common and in places abundant throughout the state, except the extreme west. Distributed from southern Newfoundland southward along the mountains to northern Georgia and western Florida, westward to Lake of the Woods, eastern Nebraska, eastern Kansas, and Texas. Often planted as a shade tree. The wood is heavy and close-grained, hard, tough, and takes a good polish. It has a high fuel value and is much used as firewood. Forms with the grain curled or contorted are known as "curled" or "birdseye maple" and are much valued in cabinet-making. The sap is the main source of "maple sugar." The Chippewa Indians of the northern part of the state still make considerable sugar from the sap. Blossoms in April and May, fruit ripe in July and August. (See cut, p. 260.)

7. **Acer nigrum** Michx. f. Hist. Arb. Am. 2: 238. 1810.

BLACK SUGAR MAPLE

A tree nearly as large as the preceding species, bark somewhat darker; leaves green and scarcely paler beneath, usually pubescent on the under side and along the petiole, but not always so, lobes wider and usually shorter than in the preceding species, not toothed, sinus at the base commonly

ACER (×⅜)

closed making the leaf appear peltate; stipules often conspicuous; in all other respects like the sugar maple. (*Nigrum*, black.)

In rich woods, common in the southeastern corner of the state where it seems to be quite distinct. Farther north it seems to grade into the preceding species. New Hampshire to Minnesota and South Dakota, south to West Virginia, Kentucky, and eastern Kansas. The wood is essentially the same as in the sugar maple and the sap is used in the same way. Blossoms in May.

8. Acer platanoides L. Sp. Pl. 1055. 1753.

NORWAY MAPLE

A large tree with spreading branches, sometimes attaining a height of 32 m.; leaves 5-(rarely 7-) lobed, 8–20 cm. wide, 7–15 cm. long, slightly cordate at the base, lobes coarsely toothed and acute-pointed, glabrous above, pubescent in the angles of the veins beneath; petioles 8–10 cm. long; inflorescence a corymb, appearing with the leaves, 6–7 cm. broad, glabrous; flowers yellowish green, 10–12 mm. broad; samaras widely spreading, 3–5 cm. long, wings 8–10 mm. wide. (*Platanoides*, like the plane tree.)

Grown in parks and along boulevards, sometimes escaping from cultivation in the East. Native of middle Europe and Asia Minor. Blossoms in May, fruit ripe in autumn.

Several garden forms are recognized among which the following are frequently planted in this state: f. *globosum*, having a globose head; f. *Reitenbachi*, greenish red when unfolding, turning dark blood red in late summer; f. *Schwedleri*, leaves bright red when young, later turning to dark green.

9. Acer Negundo L. Sp. Pl. 1056. 1753.

BOX ELDER

A tree 12–20 m. high, usually dividing into a number of stout, spreading branches; bark on trunk dark gray or brown, deeply divided into broad, rounded ridges; leaves 3–5-foliolate, with slender petioles, leaflets ovate or oval, 4–10 cm. long, 2–7 cm. broad, rounded or wedge-shaped at the base, acute or acuminate at the apex, coarsely and irregularly serrate, sometimes 3-lobed, glabrous or slightly pubescent, bright green above, paler beneath; flowers dioecious, appearing with the leaves, the staminate borne in umbel-like clusters from non-leafy shoots, the pistillate in terminal racemes on leafy shoots, small, greenish, the staminate on long, hairy pedicels; fruit in racemes; samaras slightly spreading, wings 4–5 cm. long, 10–14 mm. wide, greenish yellow, falling in autumn or persisting into the winter. (*Negúndo*, of uncertain derivation.)

Along banks of streams and lakes and along fences, edges of thickets, etc. Common throughout the state especially southward and westward, less frequent northeast. Distributed from Vermont to Minnesota, south to Florida, Louisiana, and Texas. Extensively planted as a shade tree and windbreak, especially in the prairie regions of the state. Reproduces very easily from seed. The wood is creamy white in color, close-

grained, light, soft and not strong, used for fence posts, firewood, and to a small extent manufactured into furniture. The sap is used in some localities for making maple sugar. Blossoms in April, fruit ripe in autumn.

A. Negundo var. **violaceum** Kirch. Arb. Mosc. 190. 1864.

Differs from the species in having the young branches pale or bluish violet, covered with a glaucous bloom; winter buds slightly larger than in the species; leaves 3–7-foliolate, leaflets somewhat thicker and lanceolate to oblong-ovate or obovate, often entire or irregularly dentate or lobed, pubescent along the veins beneath and with conspicuous tufts of hairs in the axils of the veins. (*Violáceum*, purplish, referring to the color of the twigs.)

In the southern part of the state, occurring with the species. Western Massachusetts to Minnesota, south to Ohio and Missouri, also in Idaho.

A. Negundo var. **interius** Sarg. Bot. Gaz. 67: 239. 1919.

Young branches covered with a close, pale, and short pubescence; leaves trifoliolate, the petiole and rachis as well as the petiolules short pubescent; leaflets ovate to obovate, coarsely serrate, the terminal one more or less distinctly 3-lobed, generally villous pubescent along the veins beneath. (*Intérius*, relating to the inner part of the country.)

Infrequent along the western border. Southern Manitoba and western Minnesota to Saskatchewan, Alberta, and Wyoming, south in the mountains to New Mexico and Arizona.

SAPINDACEAE SOAPBERRY FAMILY

Trees or shrubs, rarely herbaceous plants, with watery sap; leaves alternate, or more rarely opposite, pinnately or palmately compound, without stipules; flowers polygamo-dioecious, regular or more commonly irregular; calyx-lobes 4–5, imbricated; petals 3–5; disk fleshy; stamens 5–10, often 8, rarely more numerous, usually inserted within the disk; ovary 2–4-celled; ovules 1 or more in each cavity; fruit various.

A family of about 127 genera and nearly 1,100 species chiefly confined to tropical regions, a few subtropical and temperate.

AESCULUS L. Sp. Pl. 344. 1753.

HORSE-CHESTNUT, BUCKEYE

Trees or shrubs with opposite, digitately compound leaves; leaflets serrate and straight-veined; flowers in a terminal panicle, often polygamous, most of them with imperfect pistils; calyx tubular, 5-lobed often gibbous at the base; petals 4–5, unequal; stamens 6–8 (mostly 7), unequal in length; ovary 3-celled; style 1; ovules 2 in each cavity of the ovary; fruit a leathery

capsule, 3-valved, 3-seeded, or frequently only 1-seeded; seeds very large with thick shining coat and a large scar; cotyledons very thick and fleshy. (*Aésculus*, the ancient name of some oak or mast-bearing tree.)

A genus of about 16 species natives of America and Asia.

1. Flowers white, spotted with yellow and purple; leaflets abruptly acuminate 1. *Ae. Hippocastanum*
2. Flowers yellow; leaves acuminate; bark fetid 2. *Ae. glabra*

Aesculus Hippocastanum

1. Aesculus Hippocastanum L. Sp. Pl. 344. 1753.

HORSE-CHESTNUT

A medium-sized to large tree, 10–20 m. high; bark brown, fissured into irregular, plate-like scales; leaves long-petioled; leaflets 5–7 (sometimes 3), obovate, sessile, 8–20 cm. long, 2.5–6 cm. wide, narrowed towards the base, abruptly acuminate at the

apex, irregularly crenate-serrate, pubescent when young, glabrate when mature; flowers numerous in large panicles, white, blotched with yellow, showy, 12-15 mm. long; stamens exserted; fruit globose, covered with spines; seeds with a large, conspicuous scar. (*Hippocástanum*, horse-chestnut.)

This species is cultivated to a slight extent in parks and yards, especially in the southeastern part of the state. Introduced from Asia via Europe. It is grown very extensively farther south and east and occasionally found escaped from cultivation.

The wood is whitish, slightly tinged with yellow, light, soft, and very close-grained. Blossoms in May and June, fruit ripe in August and September.

AESCULUS GLABRA

2. Aesculus glabra Willd. Enum. Pl. Hort. Berol. 405. 1809.

OHIO BUCKEYE, FETID BUCKEYE

A tree reaching a maximum height of about 16 m.; bark of trunk dark and furrowed, exhaling a fetid odor; leaves opposite, long-petioled; leaflets 5-7, oval, oblong or

lanceolate, 8–15 cm. long, 2.5–6 cm. wide, narrowed at the base, acuminate at the apex, finely and sharply serrate, glabrous above, pubescent in the axils of the veins beneath; inflorescence a terminal panicle, 10–15 cm. long, about 5 cm. in diameter; flowers numerous, pale yellow, about 15 mm. long; calyx campanulate; petals 4, slightly unequal; stamens curved, exserted; fruit 2.5–3.5 cm. in diameter, very prickly when young, becoming smoothish at maturity. (*Glábra*, smooth.)

Frequently planted. Distributed in woods from the Alleghenies of Pennsylvania west to Michigan, south to Alabama, Nebraska, and Oklahoma. The wood is soft and white, the sapwood slightly darker, weighing 28 lbs. The timber is used for artificial limbs and for several kinds of woodenware articles. Blossoms in April and May, fruit ripe in August and September.

RHAMNACEAE BUCKTHORN FAMILY

Erect or climbing shrubs or small trees, often thorny; leaves mostly alternate, simple, stipulate, often prominently 3–5-nerved; flowers in axillary or terminal cymes or racemes, small and regular, perfect or polygamous; calyx tube obconic or cylindric; sepals 4 or 5, small; petals 4–5, inserted on the calyx tube or lacking; stamens 4–5, in front of the petals; disk fleshy; ovary free from or immersed in the disk, 3–5- (mostly 3-) celled, one ovule in each cell; fruit a drupe or capsule, mostly 3-celled; seeds solitary in each cell.

A family of about 50 genera and 600 species, natives of warm and temperate regions.

1. Calyx and disk free from the ovary; fruit a drupe — 1. *Rhamnus*
2. Calyx and disk adherent to base of ovary; fruit a dry capsule — 2. *Ceanothus*

1. RHAMNUS L. Sp. Pl. 193. 1753.

BUCKTHORN

Shrubs or small trees with alternate or sometimes opposite, simple, pinnately veined leaves; flowers in axillary racemes, panicles or cymes, perfect or polygamous, greenish; calyx tube campanulate, lined with a disk, 4–5-toothed; petals 4–5, small, short-clawed, notched at the end and wrapped around the stamens, or sometimes lacking; disk free from the ovary; stamens 4–5, in front of the petals, short; ovary 3–4-celled; style 3–4-cleft; fruit a berry-like drupe, oblong or globose, containing 3–4 nutlet-like seeds. (*Rhámnus*, Gr. *rhamnos*, buckthorn.)

A genus of about 75 species, native of temperate and warm regions. Five of these occur in the eastern and six in the western parts of North America. The species of this genus, and particularly the European ones, are the alternate hosts for the oat rust, *Puccinea coronata*. It is therefore inadvisable to plant oats in the vicinity of buckthorn hedges, and where oats are an important crop, the planting of buckthorn should be discouraged.

1. Leaves crenate-serrate; flowers dioecious or polygamous, nutlets grooved on the back.

a. Leaves with 5–7 pairs of veins; sepals and stamens 4, petals wanting; low native shrub 1. *R. alnifolia*
b. Leaves with 3–4 pairs of veins; sepals, petals and stamens 4; introduced shrub or small tree 2. *R. cathartica*

2. Leaves with entire or faintly crenulate margins; flowers perfect; nutlets smooth on the back 3. *R. Frangula*

1. Rhamnus alnifolia L'Her. Sert. Angl. 5. 1788.

DWARF ALDER

A small shrub 3–6 dm. high, thornless; bark gray or dark on the old branches; young twigs puberulent; leaves alternate, ovate to elliptic 4–10 cm. long, 2–5 cm. wide, rounded or narrowed at the base, acute or obtuse at the apex, crenate-serrate, glabrous above, puberulent along the veins beneath, veins nearly straight, in 4–6 pairs; petioles 4–10 mm. long; flowers 1–3 in the axils of the leaves and appearing with them, green, small, 2–3 mm. broad, mostly dioecious; sepals 5, about 1 mm. long; petals lacking; pedicels slender, 4–5 mm. long; fruit a black, ovoid or globose drupe, about 6 mm. in diameter; nutlets 3. (*Alnifólia*, leaves as in *Alnus*, the alder.)

Mostly in tamarack swamps throughout the northern half of the state and as far south as Minneapolis. Distributed from Newfoundland to British Columbia, south to New Jersey, Pennsylvania, Illinois, Nebraska, Wyoming, and California. Blossoms in May and June, fruit ripe in July and August.

2. Rhamnus cathartica L. Sp. Pl. 193. 1753.

BUCKTHORN

A shrub or small tree 2–6 m. high; bark brown; twigs often ending in stout thorns; leaves alternate or sometimes opposite, ovate or elliptic, 3–6 cm. long, 1.5–3 cm. wide, rounded or narrowed at the base, obtuse or acuminate at the apex, minutely serrate, glabrous; petioles 1–2 cm. long; flowers clustered in the axils of the leaves, dioecious, greenish, about 4 mm. broad; sepals 4, spreading or reflex, lanceolate, 2 mm. long; petals 4, minute, erect, about the same length as the stamens; pedicels 5–8 mm. long, slender; fruit a globose drupe about 8 mm. in diameter, with 3–4 grooved nutlets. (*Cathártica*, purgative.)

Frequently planted for hedges. Introduced from Europe and native of that continent and Asia. Flowers in May and June, fruit ripe in August and September. The leaves remain green and are retained on the shrubs until very late in the autumn.

3. Rhamnus Frangula L. Sp. Pl. 193. 1753.

ALDER BUCKTHORN

A shrub or small tree up to 7 m. high; young twigs grayish brown, somewhat puberulent; older twigs brown or grayish, generally dotted with numerous light-colored lenticels; leaves alternate, thin, elliptic to obovate, 3.5–6.5 cm. long, 2–4.5 cm. wide with 5–8 pairs of veins, rounded or narrowed at the base, acute or short acuminate at the apex, bright green and glabrous above, somewhat paler and finely pubescent

along the veins beneath, becoming nearly or quite glabrous with age, margin entire or sometimes faintly crenulate; petioles 1–2 cm. long; flowers greenish, axillary, in few-flowered umbels or sometimes solitary; hypanthium short campanulate; sepals 5, narrowly ovate, acute, mostly erect; petals obovate, emarginate; pedicels 5–10 mm. long; fruit a subglobose drupe, about 8 mm. in diameter, purplish black when ripe; nutlets 3, compressed, not grooved on the back. (*Frángula*, Latin name of this plant in the Middle Ages.)

Occasionally planted as an ornamental shrub. Native of Europe and western Asia. Naturalized in New York, New Jersey, and Long Island. Blossoms in May and June, fruit ripe in July and August.

RHAMNUS

2. CEANOTHUS L. Sp. Pl. 195. 1753.

RED-ROOT

Low bushes or shrubs with alternate, simple, petioled leaves; flowers white, blue, or yellow, in small umbel-like clusters forming dense panicles or corymbs at the summit of naked flower branches; calyx tube top-shaped, sepals 5, incurved; petals 5, hooded and spreading, with slender claw, longer than the calyx lobes, attached under the disk; stamens 5; filaments elongated; ovary sunk in the disk, 3-celled; styles 3, short; fruit a dry capsule, 3-lobed, splitting lengthwise at maturity into 3 nutlets. (*Ceanóthus*, ancient Greek name for some plant.)

A genus of 35 species, natives of North America and Mexico, only the two following occurring within our range.

1. Leaves ovate or ovate-oblong, pubescent 1. *C. americanus*
2. Leaves, oblong or narrowly oval, or elliptic-lanceolate, nearly smooth 2. *C. ovatus*

CEANOTHUS AMERICANUS (below) CEANOTHUS OVATUS (above)

1. Ceanothus americanus L. Sp. Pl. 195. 1753.

NEW JERSEY TEA

Branching shrub, 3–9 dm. high with several branches from a deep reddish root, branches grayish to reddish brown, more or less downy pubescent above, nearly or quite glabrous below; leaves ovate or ovate-oblong, with three principal nerves, 3–10 cm. long, 2.5–5.5 cm. broad, mostly obtuse or cordate at the base, acute at the apex, finely serrate, pubescent on both sides especially along the veins; petioles 6–12 mm. long; peduncles several, axillary and terminal, naked or with one or two leaves just below the flowers, 10–15 cm. long; flowers very numerous, in dense umbel-like clusters, white, small, about 2 mm. broad; pedicels 7–8 mm. long; petals long and narrowly clawed; fruit globose, depressed, faintly 3-lobed, splitting into 3 valves. (*Americánus*, American.)

Common throughout the state, except far northward. Distributed from central Maine to Ontario and Manitoba, south to Florida and Texas. The leaves were used for tea during the American Revolution. This small shrub has a thick, gnarled root, often 15–20 cm. in diameter. Flowers in July, fruit ripe in September.

2. Ceanothus ovatus Desf. Hist. Arb. 2: 381. 1809.

SMALLER RED-ROOT

A shrub 3–6 dm. high, much branched, nearly glabrous throughout; leaves narrowly oval or elliptic-lanceolate, 2–5 cm. long, 1–2.5 cm. wide, narrowed or rounded at the base, obtuse at the apex, finely and sharply glandular-serrate, glabrous or slightly pubescent along the principal veins; petioles about 5 mm. long; peduncles short, nearly always terminal; flowers in dense, umbel-like clusters, white, about 5 mm. broad; pedicels 10–15 mm. long; fruit globose, slightly flattened at the top, faintly 3-lobed. (*Ovátus*, ovate, referring to the shape of the leaf.)

Probably throughout the state but less common than the preceding. Distributed from Vermont and eastern Massachusetts to Manitoba, Minnesota, Illinois, and south to Texas. Blossoms in June, fruit ripe in September.

C. ovatus var. **pubescens** T. & G., S. Wats. Bibl. Index, 1:166. 1878.

This variety has leaves permanently sordid tomentose. It occurs in the southern part of the state. (*Pubéscens*, hairy.)

VITACEAE GRAPE FAMILY

Climbing or erect shrubs with watery, acid juice; leaves alternate, simple, palmately veined or lobed, or compound; tendrils and flower clusters opposite the leaves; flowers in panicles, racemes, or cymes, small, regular, greenish, perfect or polygamo-dioecious; calyx entire or 4–5-lobed; petals

4–5, separate or coherent, valvate, often falling off when the flowers open; stamens 4–5, opposite the petals; filaments short; disk present or sometimes lacking; ovary 2-celled, generally immersed in the disk; ovules 1–2 in each cavity; fruit a 2-celled berry; seeds usually 4, seed-coats bony.

A family of about 10 genera and 600 species, widely distributed but the greater number of species in the tropical regions.

1. Hypogynous disk present; petals deciduous as they open — 1. *Vitis*
2. Hypogynous disk lacking; petals not deciduous as they open — 2. *Parthenocissus*

VITIS LABRUSCA VITIS VULPINA

1. VITIS L. Sp. Pl. 202. 1753.

GRAPE

Climbing or trailing, woody vines, rarely shrubby, mostly with tendrils; leaves simple (in our species), usually palmately lobed or dentate; flowers in a compound thyrse, very fragrant, mostly dioecious or polygamo-dioecious; calyx very short, usually with a nearly entire border or none at all; petals 5, separating only at the base, and falling without expanding; hypogynous disk of 5 nectar-bearing glands, alternate with the stamens; fruit a globose or ovoid berry, few-seeded and pulpy, seeds with a beak-like base. (*Vitis*, the classical Latin name of the vine.)

A genus of about 40 species, natives of warm and temperate regions. In addition to the following, some other species occur in the southern and western parts of the United States.

1. Lower surface of the leaves velvety tomentose; berries 14–18 mm. in diameter (cultivated) 1. *V. labrusca*
2. Lower surface of the leaf nearly glabrous, or pubescent along the veins and in their axils, not tomentose all over; berries 8–12 mm. in diameter (native).
   a. Leaves whitened or glaucous beneath, rusty flocculent-pubescent along the veins; margin crenate-dentate 2. *V. bicolor*
   b. Leaves green beneath, bristly gray pubescent along the veins or nearly glabrous in age; margins sharply dentate 3. *V. vulpina*

1. Vitis labrusca L. Sp. Pl. 203. 1753.

NORTHERN FOX-GRAPE

Climbing or trailing vines, often ascending tall trees; stems sometimes becoming 6–12 cm. in diameter; bark loose and separating into strips; twigs rusty pubescent, especially when young; leaves opposite the tendrils, cordate, dentate or deeply lobed, with rounded sinuses, 4–12 cm. long, 5–14 cm. wide, upper surface glabrous or nearly so when mature, tawny or rusty pubescent beneath; petioles 5–10 cm. long, rusty pubescent; fertile flowers in compact panicles, 6–10 cm. long; staminate inflorescence looser; flowers yellowish green, fragrant; berries black or brownish purple, with a bloom, 10–15 mm. in diameter, borne in compact bunches, strongly musky. (*Labrúsca*, the wild grapevine.)

Occurs in moist or dry thickets, from New England to the Allegheny Mountains, south to Georgia also in northwestern Indiana. This species has given rise, through cultivation, to the Isabella, Catawba, Concord, and other varieties of grapes. The *labrusca* grapes have been long cultivated in the southern half of the state, but are not entirely hardy, requiring protection in winter. Flowers in May or early June, fruit ripe in September.

The *Beta* grape, a cross between *V. labrusca* and *V. vulpina* with possibly some admixture of *V. aestivalis* is being increasingly cultivated in the northwest. The foliage in general resembles that of *V. vulpina* while the berries are intermediate in size. It is entirely hardy.

2. Vitis vulpina L. Sp. Pl. 203. 1753.

RIVER BANK OR FROST GRAPE

Climbing or trailing vine, ascending high into tall trees; stems 2–10 cm. in diameter, with loose, fissured bark; leaves alternate, the upper ones opposite tendrils or inflorescences, 6–20 cm. long, 5–15 cm. broad, cordate, mostly 3–7-lobed, with broad sinuses, coarsely toothed, glabrous or with scattered hairs along the veins beneath; petioles 5–10 cm. long; inflorescences paniculate, rather loose, 8–12 cm. long; flowers small, greenish, very fragrant; fruit a bluish black berry, with bloom, 6–10 mm. in diameter, very juicy and sour. (*Vulpína*, pertaining to a fox.)

Common throughout the state. Distributed from New Brunswick to West Virginia, westward to North Dakota and Kansas. The wild grape vine is sometimes grown as a climber on porches, pergolas, etc. The fruit is used in making wine and preserves. Blossoms in May and June, fruit ripens from September to November.

3. Vitis bicolor Le Conte, Proc. Phil. Acad. 6: 272. 1852.

BLUE OR WINTER GRAPE

A high-climbing or trailing vine with cinnamon-colored bark and long intermittent tendrils; young branches terete, reddish brown, glabrous or nearly so; leaves nearly orbicular in outline, deeply cordate at the base, 10–25 cm. long and nearly as wide, more or less deeply 3–5-lobed, the lobes broadly triangular with open, shallow sinuses between them or sometimes ovate or irregular with deep, rounded sinuses, their tips acute or acuminate, rarely blunt, margin crenate-dentate, leaves bright green and glabrous above, glaucous or whitened beneath (the bloom sometimes disappearing towards the end of the season), with rusty, flocculent pubescence in the axils of the principal veins and cobwebby along the smaller reticulate veins; petioles rather stout, glabrous, 8–15 cm. long; inflorescence compact; berries bluish black, with a bloom, 8–10 mm. in diameter, sour; seeds about 4 mm. long. (*Bicolor*, two-colored, referring to the difference in color between the two surfaces of the leaf.)

Comparatively rare in the southeastern part of the state as far north as Wabasha County. New Hampshire to Minnesota, south to North Carolina and Missouri. Blossoms in late May or early June, fruit ripe in September and October.

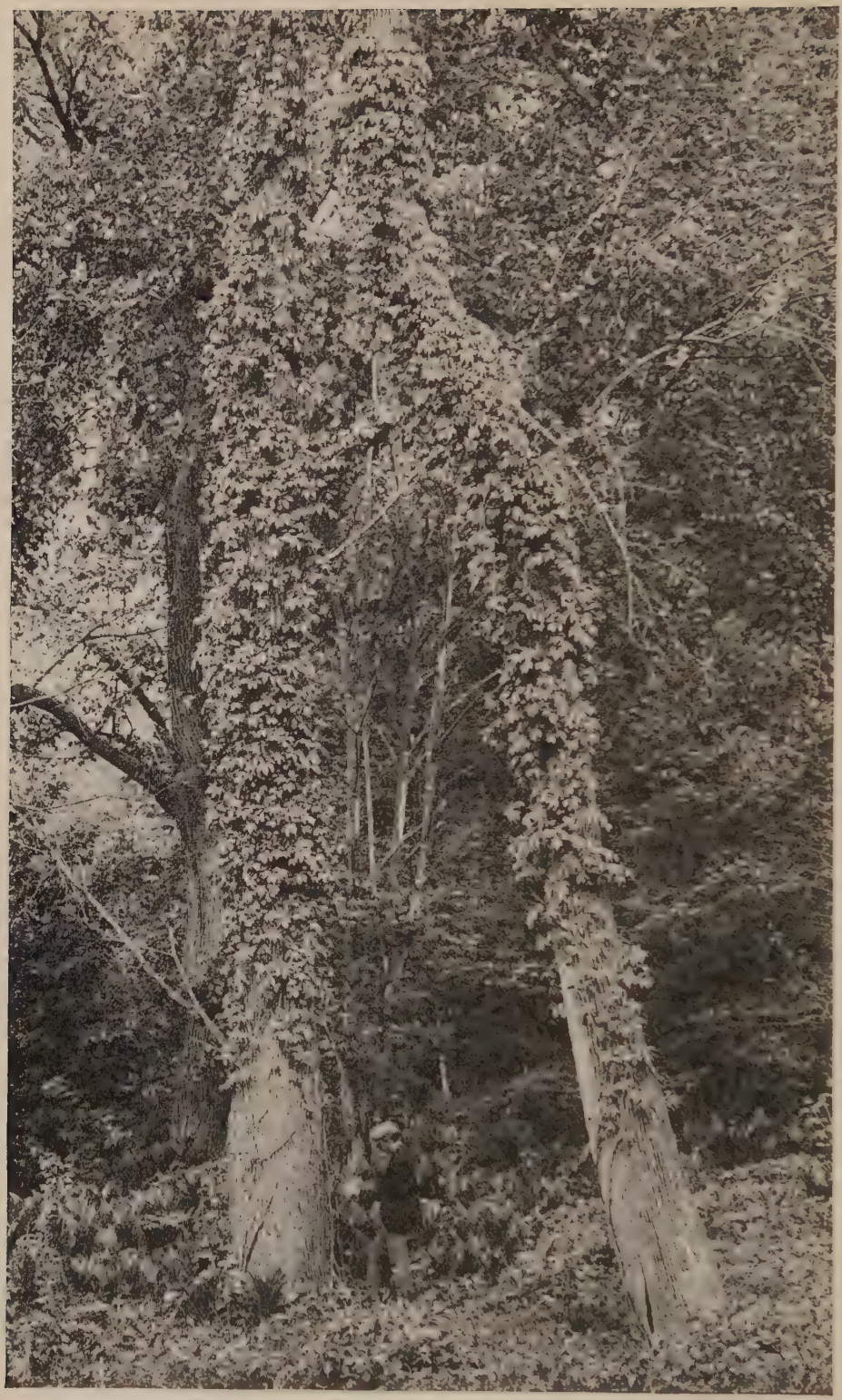
2. PARTHENOCISSUS Planch. in DC. Mon. Phan. 5²: 447. 1887.

VIRGINIA CREEPER, WOODBINE

Climbing or trailing, woody vines with alternate, digitately compound or simple lobed leaves; tendrils tipped with adhesive expansions or disks, or sometimes only coiling; inflorescence a compound cyme or panicle, flowers perfect or polygamo-dioecious; calyx slightly 5-lobed; petals thick and concave, expanding before dropping off, disk obsolete or wanting in our species; stamens 5; ovary 2-celled; ovules 2 in each cavity; fruit a globose, 1–4-seeded berry, flesh thin, inedible. (*Parthenocissus*, Gr. *parthenos*, virgin, *cissos*, ivy.)

A genus of about 10 species natives of eastern North America and Asia.

1. Leaves simple and lobed or some 3-foliolate — 1. *P. tricuspidata*
2. Leaves all palmately compound, 5–7-foliolate.
   a. Tendrils with 5–12 branches, mostly with adhesive disks; leaflets much paler beneath — 2. *P. quinquefolia*
   b. Tendrils with 2–5 branches, mostly without adhesive disks; leaflets not much paler beneath — 3. *P. vitacea*



Woodbine on Elm Trees in Houston County

1. Parthenocissus tricuspidata (Sieb. & Zucc.) Planch. in DC. Mon. Phan. 5²: 452. 1887.

BOSTON IVY

A high-climbing vine, very closely appressed when growing on walls; young shoots, and foliage pinkish, with scattered granules of wax; tendrils short and much branched adhesive disks large and numerous; leaves mostly simple, 3-lobed and palmately veined, more rarely 3-foliolate, very coarsely toothed, the teeth mucronate-tipped and bristly ciliate, both surfaces with a few scattered, short, stiff hairs; the simple leaves cordate at the base, acute at the apex, 5–9 cm. long, 5–8 cm. wide; leaflets of the compound leaves 5–7 cm. long, the two lateral ones oblique at the base; petiole stout, 4–8 cm. long; flowers in short-stalked racemes; fruit a blue-black berry. (*Tricuspidáta*, three-toothed.)

This species is not reliably hardy in Minnesota and is able to endure our winters without injury only when growing in exceptionally well-protected situations. Very extensively cultivated in the cities of the eastern states. Native of China and Japan.

PARTHENOCISSUS QUINQUEFOLIA

2. Parthenocissus quinquefolia (L.) Planch. in DC. Mon. Phan. 5²: 448. 1887.

VIRGINIA CREEPER, WOODBINE

Ampelopsis quinquefolia Michx. 1803.
Psedera quinquefolia Greene, 1906.

A high-climbing or trailing woody vine; stem sometimes 3–6 cm. in diameter; tendrils opposite the leaves, 5–12-branched, mostly ending in ad-

hesive disks; leaves petioled, 5–7-foliolate, leaflets stalked, oval-elliptic or oblong-lanceolate, 4–12 cm. long, 2–6 cm. wide, coarsely serrate, dull green above, much paler or glaucescent beneath, glabrous throughout; inflorescence paniculate, 6–12 cm. long, rather loose, its main branches unequal; flowers small, greenish, about 6 mm. broad; calyx forming a shallow cup; petals spreading or reflexed, about 2.5 mm. long; stamens erect, slightly shorter than the petals; fruit a blue-black berry, not very fleshy, 6–7 mm. in diameter. (*Quinquefólia*, five-leaved.)

In woods and thickets in the southeastern part of the state as far north as the Twin Cities. Distributed from New Hampshire to Minnesota south to Florida, Texas, and Mexico. Blossoms in June, fruit ripe in September.

Extensively planted as a climber on porches, fences, walls, etc. Called *Parthenocissus* or *Ampelopsis Engelmanii* by horticulturists.

The native material appears to belong to the variety *P. quinquefolia* var. *hirsuta* (Donn) Planch., characterized by pubescent foliage. A form with numerous aerial roots has been described as var. *Saint-Paulii* Rehder. The latter is known to occur as far north as the Twin Cities.

PARTHENOCISSUS TRICUSPIDATA

PARTHENOCISSUS VITACEA

3. Parthenocissus vitacea Hitchcock, Key to Spring Flora of Kansas, 26. 1894.

A high-climbing or trailing vine; tendrils with 2–5 long twining branches, these only very rarely ending in adhesive disks, no aerial rootlets; leaves petioled, digitately compound; leaflets 5–7, ovate to ovate-lanceolate, 4–13 cm. long, 2–8 cm. wide, cuneate or slightly rounded at the base, acute at the apex, coarsely dentate, deep green, thin, somewhat shining above, scarcely paler beneath, glabrous or slightly pubescent; petioles 5–10 mm. long; inflorescences regularly dichotomous, flat-topped, peduncles 4–8 cm. long, the first branches nearly equal; flowers greenish, about 5 mm. in diameter; calyx entire, shallow; petals spreading or reflexed; fruit obovoid, bluish black, 6–10 mm. in diameter, somewhat fleshy, at least more so than in the preceding. (*Vitácea*, like the grape vine.)

Common throughout the state except northeastward. Distributed from Maine to Alberta and south to Pennsylvania, Texas, and Arizona. Planted to some extent. The leaves turn a brilliant scarlet in the fall, becoming very showy.

TILIACEAE LINDEN FAMILY

Trees or shrubs, rarely herbs, mostly with alternate, simple leaves, and decidious stipules; flowers cymose or paniculate; sepals 5, rarely 3 or 4, valvate, deciduous; petals 5, rarely 3, 4, or 0, mostly imbricated; stamens many, generally united at the base into 5–10 groups; anthers 2-celled; carpels 2–many, united into a compound pistil; ovary 2–many-celled, style 1; stigma capitate or with as many lobes as there are carpels; fruit 2–many-celled, a capsule or nutlike.

A family of 35 genera and about 350 species. All the genera except the following are natives of the tropics or of the warm temperate regions. The inner bark of all *Tiliaceae* is very fibrous. The commercial fibre, jute, is derived from the genus *Corchorus*.

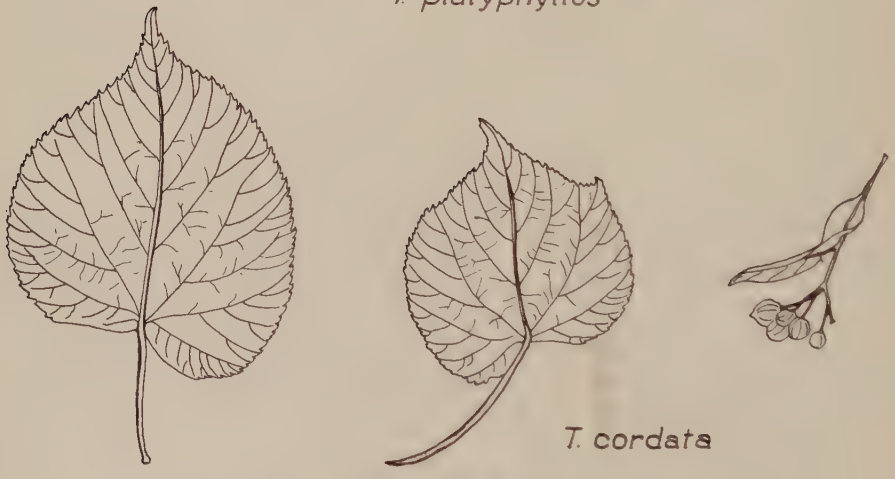
TILIA L. Sp. Pl. 514. 1753.

BASSWOOD, LINDEN

Trees with alternate, serrate, cordate leaves; flowers in drooping cymes; peduncles subtended by a broad membranaceous bract with which it is more or less fused; sepals 5; petals 5; stamens many, free or united into 5 groups opposite the petals, either all fertile or with one petal-like staminode in each group; ovary 5-celled, with the carpels opposite the sepals; ovules 2 in each cell, ascending; style simple, with a 5-lobed stigma, fruit nut-like, 1–few-seeded, globose or pyriform; cotyledons lobed. (*Tilia*, the classical Latin name for the linden.)

T. americana

T. platyphyllos



T. cordata

TILIA (×¾)

A genus of about 20 species, native of the north temperate zone.

1. Petioles and leaves glabrous except for tufts of hairs in the axils of the veins beneath, rarely a few scattered hairs along the veins; cymes several–many-flowered.
   (a) Leaves 6–15 cm. long, green on both sides, flowers with a petal-like staminode in front of each petal 1. *T. americana*
   (b) Leaves mostly under 6 cm. long, pale or bluish underneath; flowers without staminodes 2. *T. cordata*
2. Petioles and the leaves pubescent, especially along the veins beneath; cymes mostly 3-flowered 3. *T. platyphyllos*

1. Tilia americana L. Sp. Pl. 514. 1753.

BASSWOOD, AMERICAN LINDEN

A large tree attaining a maximum height in Minnesota of about 25 m. and a trunk diameter of 1 m., with narrow pyramidal head, frequently growing in clusters of 2 or more trees; bark of trunk dark gray with deep longitudinal furrows; branches and young trunks remaining smooth and light gray; twigs somewhat zigzag, rather slender, bright red or greenish, smooth and shining; buds elliptical, plump, bud scales glabrous except for ciliation along the margin; leaves broadly ovate, unequally cordate at the base, acuminate at the apex, 6–16 cm. long, 5–13 cm. wide (on stump sprouts sometimes attaining a length of 40 cm.), palmately veined, the main veins, connected with numerous parallel cross veins, dark green and glabrous above, somewhat paler beneath and glabrous except for small tufts of hairs in the axils of the main veins, rarely with a few scattered hairs along the main veins, sharply serrate, serrations terminating in awn-like appendages; petiole about half as long as the blade; stipules oblong, prominent on the young growth but soon deciduous; flowers appearing in midsummer in pendulous cymose clusters from the axils of foliage leaves, each cluster subtended by a membranaceous bract, to which the peduncle is fused for about half its length; bracts spatulate, 7–10 cm. long, very veiny, stalk of the bract very short; flowers very fragrant, 12–15 mm. in diameter; stamens about 60, much shorter than the petals; style long exserted; fruit gray, covered with short stellate pubescence, without ridges, about 4–5 mm. in diameter. (*Americána*, American.)

In rich soil, common throughout the state, one of the most abundant trees in the Big Woods district. New Brunswick to Manitoba, south to Georgia and Texas. Wood white, soft, light, and weak, used for cabinet work, boxes, excelsior, pulp, etc. The inner bark is very tough and fibrous and is used for mats and cordage.

2. Tilia cordata Mill. Gard. Dict. ed. 8. no. 1. 1768.

WINTER LINDEN, SMALL-LEAVED LINDEN

A tree attaining a height of about 25 m. with an oblong to spreading crown; twigs glabrous, reddish brown; buds elliptical, bud scales glabrous or sparcely pubescent and

ciliate along the margin, marked with minute, glistening crystals; leaves nearly orbicular, 3.5–8 cm. long, 4–7.5 cm. wide, base cordate, apex acuminate, slightly unequal, palmately veined, the smaller veins forming an irregular network without conspicuous parallel cross-veins, upper surface dark green, glabrous, lower surface much paler and bluish, glabrous except for tufts of rusty hair in the axils of the principal veins, margin sharply serrate; petiole about three-fourths the length of the blade, glabrous; flowers in nearly upright cymes, bract oblanceolate to oblong, narrowed at the base, prominently stalked, stalk 0.6–20 mm. long; flowers about 1 cm. in diameter; stamens about 30, longer than the petals; staminodes lacking; fruit elliptical to oval, thin-shelled, without ribs, covered with rusty, spreading hairs, about 5 mm. long and 4 mm. in diameter. (*Cordáta*, heart-shaped, referring to leaf.)

European tree. This species blossoms about two weeks later than the other European Linden.

3. **Tilia platyphyllos** Scop. Fl. Carn. ed. 2. 373. 1772.

LARGE-LEAVED LINDEN, SUMMER LINDEN

A medium-sized to large tree with a wide to oval crown; twigs pubescent, becoming smooth and reddish brown; buds broadly ovoid, plump, bud scales sparsely hirsute or nearly glabrous except at the tips, marked with minute, glistening crystals; leaves broadly ovate to nearly orbicular, 6–10 cm. long, 5–9.5 cm. wide, abruptly acuminate at the apex, base obliquely cordate, palmately veined, the principal veins connected by numerous parallel cross-veins; young foliage gray-white pubescent, mature leaves nearly or quite glabrous above, hirsute below, especially along the veins, margin sharply serrate; petiole about half as long as the blade, hirsute; cymes mostly 3-flowered, rarely up to 9-flowered; bract oblong, narrowed or unequally truncate at the base, its stalk 0.5–1.5 cm. long; flowers about 1.5 cm. in diameter; stamens about 30, exserted; staminodes lacking; ovary white pubescent, conspicuous; fruit pear-shaped or oblong, more or less strongly 4–5-ribbed, with an abundant felt-like pubescence. (*Platyphýllos*, Gr. broad-leaved.)

Native of Europe, occasionally cultivated in Minnesota. Blossoms about 3 weeks earlier than the native basswood.

TAMARICACEAE TAMARISK FAMILY

Trees or shrubs with alternate, mostly scale-like leaves without stipules; flowers perfect; sepals 4 or 5; petals 4 or 5, separate; stamens 4 or 5 (alternate with the petals) or 10 or many, with extrorse anthers; carpels 3–5, united; ovary superior, 1-celled, with 3–5 parietal or almost basal placentas; stigmas 3–5; fruit a 3–5-valved capsule, mostly with numerous hairy seeds; embryo straight, endosperm present or absent.

A family of 4 genera and about 100 species of Old World plants, chiefly of the Mediterranean and central Asiatic regions.

TAMARIX L. Sp. Pl. 270. 1753.

TAMARISK

Deciduous or sometimes evergreen shrubs or trees with scale-like leaves; flowers small, in panicles, either terminating the growth of the season or on

short, lateral, leafless shoots; sepals 4–5; petals 4–5, imbricated, pink or whitish, usually withering persistent; stamens as many or twice as many as the petals, apiculate, free or united at the base; hypogynous disk more or less evident; carpels 3–4; placentas nearly basal; styles 3–4, more or less united, short or nearly obsolete; stigmas 3–4; fruit a capsule; seeds small, bearing a tuft of hairs. (*Támarix*, the classical Latin name.)

TAMARIX GALLICA

A genus of about 75 species of the warmer parts of the Old World, chiefly of the Mediterranean and central Asiatic regions. Some of them are very characteristic plants of the Asiatic steppes and deserts. The following species are occasionally cultivated in Minnesota. All are low to medium-sized shrubs in our climate. In all, the flowers have 5 sepals, 5 petals and 5 stamens. None of them are reliably hardy in Minnesota, but in the latitude of Minneapolis they may be grown in sheltered situations. Even though some-

times they have to be cut back nearly to the ground after a severe winter, they form ornamental plants during the following summer.

1. Leaves finely pubescent — 1. *T. hispida*
2. Leaves glabrous.
   a. Petals deciduous; stamens inserted on the ring-like disk, the filaments enlarged at the base — 2. *T. gallica*
   b. Petals persistent; stamens inserted between the lobes of the deeply lobed disk, the filaments not enlarged at the base.
      (1) Bracts and leaves ovate-lanceolate; disk 10–lobed — 3. *T. pentandra*
      (2) Bracts and leaves subulate; disk 5-lobed — 4. *T. odessana*

1. Tamarix hispida Willd. Abh. Akad. Berl. 1812–13. 77. 1816.

Shrub about 1.5 m. high; branches upright, downy when young; leaves widened at base, finely pubescent; flowers in terminal panicles of dense spike-like racemes, pink; petals deciduous; stamens inserted between the lobes of the 5-lobed disk, the filaments somewhat enlarged at the base. (*Hîspida*, hispid.)

Native of the Caspian region.

2. Tamarix gallica L. Sp. Pl. 276. 1753.

Shrub or small tree 2–6 m. high with slender, spreading, feathery branches; leaves rhombic-ovate, broadly clasping at the base, glabrous; flowers in panicled racemes, white or pinkish; petals deciduous; stamens inserted on the ring-like disk, the filaments enlarged at the base. (*Gállica*, French.)

Native from western Europe to the Himalayas.

3. Tamarix pentandra Pall. Flor. Ross. 2: 72. 1788.

Shrub or small tree up to 5 m. high; twigs purple, glabrous; leaves ovate-lanceolate, acute, glabrous; flowers in large panicles of dense racemes, pink; petals persistent; stamens inserted between the lobes of the 10-lobed disk, the filaments not enlarged at the base. (*Pentándra*, having 5 stamens.)

Native of southeastern Europe and central Asia. Its horticultural variety *amurensis*, the Amur tamarisk, is probably the hardiest tamarisk in Minnesota.

4. Tamarisk odessana Stev. ex Bunge, Tent. Gen. Tamaric. 47. 1852.

Shrub about 2 m. high, with slender, upright branches; leaves subulate, decurrent, glabrous; flowers in a large loose panicle of slender racemes, pink; petals persistent; stamens inserted between the lobes of the 5-lobed disk, the filaments not enlarged at the base. (*Odessána*, from Odessa in southern Russia.)

Native of the Caspian region.

CISTACEAE ROCK-ROSE FAMILY

Low shrubs or herbs, with alternate or opposite, simple, sometimes subulate or scale-like leaves; flowers in racemose or paniculate clusters or solitary, regular and generally perfect; sepals 5, the two outer much smaller and bract-like, sometimes only 3; petals 3 or 5, convolute in the bud, some-

times wanting; stamens many, free, hypogynous; filaments slender; ovary 1-celled with parietal placentas or incompletely 3–10-celled with widely intruding placentas; ovules few to many, orthotropous; style simple or none; stigma entire or 3-lobed; fruit a capsule, dehiscent by valves; seeds few to many, with small embryo and starchy or fleshy endosperm.

A family of about eight genera and 170 species, mostly natives of the northern hemisphere. The following genus is represented in the state by a single species.

HUDSONIA L. Mant. 1:11. 1767.

Low, tufted, diffusely branched, heath-like shrubs, with small, awl-shaped or scale-like, alternate, persistent leaves; flowers yellow, numerous, crowded along the upper part of the branches; sepals 3, similar; petals 5, obovate or oblong, larger than the sepals; stamens many; style slender; stigma minute; ovary 1-celled, placentas 3, parietal, each with two ovules; capsule 1-celled, 3-valved, included in the calyx; seeds 1–2 at the base of each placenta. (*Hudsónia*, named for the English botanist, Wm. Hudson.)

A genus of 3 species, natives of eastern North America.

Hudsonia tomentosa Nutt. Gen. 2: 5. 1818.

A densely tufted, much branched, and matted shrub, 1–3 dm. high, hoary pubescent throughout; branches very numerous, ascending; leaves densely imbricated and appressed, oblong to lance-oblong, about 2 mm. long, densely pubescent; flowers numerous, bright yellow, sessile or short-pedicelled, about 6 mm. in diameter at anthesis; sepals 3, oblong, blunt and notched at the apex, slightly shorter than the petals; petals oblong or narrowly obovate; stamens 10–30, shorter than the petals; capsule ovoid, included in the persistent calyx. (*Tomentósa*, tomentose.)

On dunes, sandy lake shores, and outcrops of sandstone, very local. In scattered places from Wabasha County to Duluth and westward as far as Dassel, Meeker County, most abundant on the sand dunes of Anoka County. New Brunswick to Minnesota, south to Virginia, and northern Indiana.

Blossoms in June, fruit ripe in July and August.

H. tomentosa var. **intermedia** Peck, Rep. N. Y. State Mus. 45: 86. 1893.

Differs from the species in having more awl-shaped leaves, generally less densely crowded, and in the more obviously pedicelled flowers. (*Intermédia*, intermediate.)

Infrequent, White Rock, Goodhue County. Eastern Quebec to Mackenzie, south to eastern New Brunswick, Maine, New Hampshire, the south end of Lake Michigan, and Minnesota.

THYMELAEACEAE LEATHERWOOD FAMILY

Shrubs or trees with very tough, acrid inner bark; leaves alternate, simple and entire; flowers in racemes or capitate clusters or borne singly, regular and mostly perfect; calyx tubular, colored, and corolla-like, petals none (in our genera); stamens usually twice as many as the calyx lobes or fewer, inserted on the calyx tube and longer than its lobes; ovary 1-celled; ovule 1, style short or elongated; fruit a berry-like drupe.

A family of about 37 genera and 460 species, widely distributed, most abundant in Australia and South Africa.

DIRCA L. Sp. Pl. 358. 1753.

LEATHERWOOD, MOOSEWOOD

Branching shrubs with tough, fibrous inner bark; branchlets jointed; leaves alternate, thin, short-petioled; flowers 2–4 in a cluster, appearing before the leaves, subtended by an involucre of hairy bud scales; calyx corolla-like, tubular funnel-shaped, obscurely 4-lobed; petals lacking; stamens inserted on the calyx tube about the middle, twice as many as the lobes, the alternate ones longer; filaments very slender; disk lacking; ovary nearly sessile, 1-celled; style filiform, long-exserted; fruit a red, oval-oblong drupe. (*Dírca*, perhaps from the name of a region in Thebes.)

A genus of 2 species, one in southeastern United States, the other in California.

DIRCA PALUSTRIS

Dirca palustris L. Sp. Pl. 358. 1753.

LEATHERWOOD

A branching shrub, 0.5–2 m. high; bark on stem brownish gray, twigs yellowish green, jointed; wood white and brittle; inner bark unusually tough; bud scales hairy, becoming very large when the flowers and leaves unfold; leaves alternate, oval or oblong, 3–8 cm. long, 1.5–5 cm. wide, rounded at the base, blunt at the apex, entire, pubescent when young, glabrous in age; petioles about 2 mm. long; flowers appearing in clusters of 2–5 before the leaves, nearly sessile, the yellowish calyx about 1 cm. long; drupe oval-oblong, red, 10–12 mm. long. (*Palústris*, pertaining to marshes.)

Common in the northeastern part of the state and westward as far as the White Earth Indian Reservation and Lake of the Woods, infrequent throughout the wooded area southward to Houston County. Distributed from New Brunswick to Minnesota, southward to Virginia and Missouri. Blossoms in April and May, fruit ripe in August. The bark was used by the Indians for making thongs; it produces violent vomiting if taken internally and is an irritant to the skin if applied externally.

ELAEAGNACEAE OLEASTER FAMILY

Shrubs or trees, mostly silvery scaly or stellate pubescent; leaves entire, opposite or alternate; flowers in clusters or, rarely, solitary in the axils of the leaves or at the nodes of twigs of the preceding season; calyx of the perfect or pistillate flowers urn-shaped, 4-lobed or -cleft, upper part deciduous; stamens 4 or 8, those of the perfect flowers inserted on the throat of the calyx; filaments short; disk round or lobed; ovary 1-celled; ovule 1, erect; style slender; fruit drupe-like, the lower part of the calyx becoming fleshy and enclosing the achene.

A family of about 20 species, of temperate and tropical regions.

1. Flowers perfect; stamens 4; leaves alternate — 1. *Elaeagnus*
2. Flowers dioecious; stamens 8; leaves opposite — 2. *Shepherdia*

1. ELAEAGNUS L. Sp. Pl. 121. 1753.

Shrubs or trees with silvery scaly branches and foliage; leaves simple, alternate, and petioled; flowers borne singly or in clusters of 2–4 in the axils of the leaves, short-stalked, perfect, or staminate and pistillate; calyx tubular, slightly constricted just above the ovary, campanulate and 4-lobed, deciduous; stamens 4, inserted on the upper part of the calyx tube; fruit drupe-like, fleshy or mealy, enclosing the ellipsoid achene. (*Elaeágnus*, Gr. *elaea*, olive, *agnos*, chaste-tree.)

A genus of about 12 species, native of Europe, Asia, North America, and Australia.

1. Twigs with brown scales, thornless; native shrub — 1. *E. argentea*
2. Twigs without brown scales, often thorny; cultivated tree — 2. *E. angustifolia*

ELAEAGNUS

1. Elaeagnus argentea Pursh. Fl. Am. Sept. 114. 1814.

SILVER-BERRY

A much branched, unarmed shrub, 1–4 m. high, stoloniferous; branches covered with ferruginous scales, becoming silvery; leaves oblong-ovate or oval-lanceolate, 3–7 cm. long, 1–3.5 cm. wide, rounded at the base, blunt or acute at the apex, densely silvery scurfy on both sides; petiole 3–5 mm. long; flowers fragrant, silvery on the outside, yellow on the inside, 10–14 mm. long; lobes of the calyx triangular, about 3 mm. long; fruit 1 cm. long, the achene 8-striate. (*Argéntea*, silvery.)

Native in the northwestern part of the state. Distributed from Quebec to Hudson Bay, British Columbia, and Yukon, south to Minnesota, South Dakota, and Utah. Blossoms from May to July, fruit ripe July to August.

2. Elaeagnus angustifolia L. Sp. Pl. 121. 1753.

RUSSIAN OLIVE

A tall shrub or more often a small tree, sometimes attaining a height of 10–16 m., often spiny; the bark on last year's twigs smooth and olive-colored; young shoots silvery gray and densely covered with stellate hairs; leaves alternate, entire, ovate-lanceolate to lanceolate, 2.5–8 cm. long, 1–1.5 cm. wide, slightly narrowed at the base, obtuse or acutish at the apex, grayish green with scattered peltate-stellate hairs on the upper surface, silvery gray beneath; petiole about 1 cm. long; flowers axillary, solitary or in groups of 2–3, very fragrant; calyx tubular-campanulate, about 1 cm. long, 8–9 mm. broad, 4-lobed, silvery gray on the outside, lemon-colored within, petals lacking; stamens very short, inserted near the throat of the calyx; pedicels 2–3 mm. long; fruit oblong-ovoid. (*Angustifólia*, narrow-leaved.)

Entirely hardy and extensively planted as an ornamental shrub or tree on account of the silvery gray foliage and fragrant flowers. Native of Europe and Asia. Blossoms in June, fruit ripe in September.

2. SHEPHERDIA Nutt. Gen. 2: 240. 1818.

BUFFALO-BERRY

Shrubs or small trees, twigs brown- or silvery-scurfy or stellate pubescent; leaves opposite, petioled; flowers small, dioecious or sometimes polygamous, in fascicles or short spikes, at the nodes of the shoots of the preceding season or axillary; calyx of pistillate flowers urn-shaped, 4-lobed, inclosing the ovary and becoming berry-like in fruit; disk 8-lobed; calyx of staminate flower 4-parted, valvate in bud, stamens 8; disk many-lobed; style slender; stigma one-sided; fruit berry-like, the fleshy calyx enclosing an achene or nutlet. (*Shephérdia*, named for John Shepherd, an English botanist.)

A genus of three known species, two of which occur within the state, the other western.

1. Leaves ovate or oval, green above, silvery beneath; thornless shrub 1. *S. canadensis*
2. Leaves oblong, silvery on both sides; mostly thorny shrub 2. *S. argentea*

1. **Shepherdia canadensis** (L.) Nutt. Gen. 2: 240. 1818.

CANADIAN BUFFALO-BERRY

Lepargyraea canadensis (L.) Greene, 1890.

A spreading shrub 1–3 m. high, thornless; bark gray, young shoots brown scurfy; leaves ovate or oval, 2–6 cm. long, 1–2.5 cm. wide, rounded at the base, blunt at the apex, green and nearly smooth above, silvery beneath but with rusty scales, petiole 4–6 mm. long; flowers in short spikes at the nodes of the twigs, the flower buds formed in the summer with the leaves, expanding before or with the leaves next spring, perianth yellowish, about 5 mm. in diameter when expanded; fruit a yellowish berry, very bitter and nauseous, about 4–6 mm. long. (*Canadénsis*, Canadian.)

This species occurs around Lake of the Woods and probably eastward along the International Boundary. Distributed from Newfoundland to Alaska, south to Nova Scotia, Maine, western New York, Michigan, Wisconsin, and Minnesota. Blossoms in April and June, fruit ripe July and August.

SHEPHERDIA ARGENTEA SHEPHERDIA CANADENSIS
(Twigs about ¾ natural size)

2. **Shepherdia argentea** Nutt. Gen. 2: 241. 1818.

BUFFALO-BERRY

Lepargyraea argentea Greene, 1890.

Shrubs or small trees 1–6 m. high, more or less thorny, with gray bark and brown- or silvery-scurfy twigs; leaves opposite, oblong-lanceolate or oblong, 2.5–5 cm. long, 6–15 mm. wide, rounded at the base, obtuse at the

apex, densely silvery scurfy on both sides; petiole 5–10 mm. long; flowers in clusters at the nodes of the twigs, yellowish; fruit ovoid, red, acid, and edible, 4–6 mm. long. (*Argéntea*, silvery.)

Occurs in the western and probably in the extreme northern part of the state. Distributed from Manitoba and Minnesota to Kansas and westward. Planted to a considerable extent as an ornamental shrub. Blossoms in May and June, fruit ripe July to August.

ARALIACEAE GINSENG FAMILY

Herbs, shrubs, and trees, sometimes climbing by means of aerial roots; stems frequently prickly or spiny; leaves alternate or rarely opposite, simple or palmately or pinnately compound; flowersp erfect, polygamous, or dioecious, regular, usually small, greenish or whitish, commonly in umbels or umbellate heads; calyx small, entire or toothed, sometimes obsolete; petals mostly 5, valvate or slightly imbricate, sometimes cohering at the apex and falling as a cap; stamens as many as petals and alternate with them, inserted on an epigynous disk; ovary inferior, 1–many-celled; styles free or connate; ovule solitary in each cell and pendulous from the apex, anatropous; fruit a berry or a drupe; seeds with abundant endosperm and small embryo.

A family of over 50 genera and about 660 species, widely distributed in tropical and temperate regions.

1. Leaves pinnately compound; petals imbricate — 1. *Aralia*
2. Leaves palmately compound; petals valvate — 2. *Acanthopanax*

1. ARALIA L. Sp. Pl. 273. 1753.

Aromatic herbs, shrubs and small trees, frequently with spiny stems; leaves deciduous, once to thrice pinnately compound; leaflets serrate; flowers on jointed pedicels, in panicled umbels, often very numerous and showy; calyx lobes 5, minute or sometimes wanting; petals 5, imbricate; stamens 5; ovary inferior, usually 5-celled, capped with a more or less flattened disk; styles mostly 5, distinct or connate only at the base; fruit a a few-seeded berry or a drupe-like body, crowned by the persistent styles, frequently becoming dry. (*Arália*, derivation obscure, perhaps a vernacular name.)

A genus of about 40 species, most abundant in the tropics and subtropics. Besides the following, two herbaceous species are very abundant in the wooded parts of Minnesota.

1. Stems slender, less than 1 m. high; prickles slender, bristle-like; leaves less than 3 dm. long, native under-shrub — 1. *A. hispida*
2. Stems very stout, 1–15 m. high; prickles stout, leaves 3–8 dm. long, cultivated — 2. *A. chinensis*

1. **Aralia hispida** Vent. Hort. Cels. pl. 41. 1800.

BRISTLY SARSAPARILLA

A nearly herbaceous plant 5–10 dm. high; stems simple, rather slender, woody at base and occasionally for 2–3 dm. above the base, armed with numerous weak, bristle-like prickles; leaves twice-pinnate 1–3 dm. long; leaflets mostly sessile, lanceolate to lance-ovate, 2.5–5 cm. long, rounded or narrowed at the base, acute to acuminate at the apex, margin sharply and irregularly serrate, dark green above, pale beneath, glabrous, or somewhat bristly on the veins beneath; petioles of lower leaves 4–10 cm. long, the upper leaves nearly sessile, the petioles and rachises of the leaves more or less bristly-prickly; flowers in umbels about 2 cm. in diameter, the lower umbels solitary, long-peduncled, the upper 3–10 forming a loose irregular cyme; flowers white, about 2 mm. in diameter, more or less monoecious; fruit purple-black, 6–8 mm. in diameter. (*Híspida*, bristly.)

Very abundant in the northeastern corner of the state and as far west as Lake of the Woods, chiefly on outcrops of granitic rocks. Newfoundland to Hudson Bay, south to North Carolina, Indiana, Michigan, and Minnesota. Flowers in June, fruit ripe in August.

2. **Aralia chinensis** L. Sp. Pl. 273. 1753.

CHINESE ANGELICA

A sparingly branched, upright shrub (in warmer climates attaining the dimensions of a small tree up to 15 m. in height), with more or less prickly stems and branches; leaves 3–8 dm. long, usually thrice-pinnate towards the base, twice-pinnate in the middle and once-pinnate towards the end; leaflets sessile or nearly so, broadly ovate to oblong-ovate, 7–15 cm. long, rounded or narrowed at the base, acuminate at the apex, margin coarsely serrate, dark green above, usually pubescent beneath; petiole 1.5–2.5 dm. long, both the petiole and rachises unarmed; umbels numerous, in large compound panicles; flowers whitish, 6–7 mm. in diameter; styles distinct, disk depressed; fruit ovoid, angled, black. (*Chinénsis*, Chinese.)

Native of eastern Asia. Occasionally planted but not entirely hardy, new stems being formed from the root each year. Blossoms after midsummer.

2a. **A. chinensis** var. **manchurica** Rehder in Bailey, Cycl. Am. Hort. 1: 82. 1900.

Stems more prickly, leaflets more sharply and densely serrate and pubescent only along the veins beneath.

Hardier than the species and therefore more often planted in our region.

2. **ACANTHOPANAX** Miq. Ann. Mus. Lugd. Bat. 1: 10. 1863.

Deciduous, smooth or prickly shrubs or trees with palmately lobed or compound, alternate leaves; flowers perfect or polygamo-dioecious, in umbels that frequently are arranged in compound panicles; sepals minute or

nearly obsolete; petals 5, rarely 4, valvate; stamens the same number as petals; carpels 2–5; ovary 2–5-celled; styles 2–5, more or less united; fruit a berry, somewhat flattened or nearly globose, pericarp thin, endocarp hard or chartaceous; seeds 2–5. (*Acanthópanax*, spiny *Panax*.)

A genus of about 18 species of the eastern Asiatic region.

Acanthopanax pentaphyllus March. Bull. Soc. Bot. Belg. 20: 79. 1881.

A shrub 1.5–3 m. high, with arching branches and slender, compressed, straight prickles below the petioles; leaves palmately 5–7-foliolate, on petioles about 10 cm. long; leaflets ovate-oblong to obovate-lanceolate, 2.5–7.5 cm. long, narrowed at the base, acute at the apex, crenate-serrate, green and glabrous on both sides or sometimes slightly spiny along the midrib beneath; petiole pubescent or spiny; umbels peduncled, borne on last year's wood; flowers greenish white; sepals minute; petals oblong-ovate, reflexed; styles connate; pedicels pubescent at the base, 7–15 mm. long; fruit globose, 5–7 mm. in diameter. (*Pentaphýllus*, five-leaved.)

Native of Japan and in cultivation for a long time. A graceful shrub, occasionally planted in the state. Flowers in June, fruit ripe in October.

CORNACEAE DOGWOOD FAMILY

Shrubs or small trees, rarely herbs; leaves simple, opposite, verticillate or alternate, usually entire; flowers perfect, polygamous or dioecious, in cymes or heads; calyx 4–5-parted or toothed, adnate to the top of the ovary; petals 4–5, valvate or imbricated, inserted at the edge of the cushion-shaped disk; stamens as many as the petals and alternating with them, or more numerous; ovary inferior, 1–4-celled; style 1; ovule 1 in each cell; fruit a 1–4-celled, 1–4-seeded drupe.

Only two genera of the family occur in North America, one of which is represented in the Minnesota flora.

1. CORNUS L. Sp. Pl. 117. 1753.

DOGWOOD

Shrubs or trees (occasionally herbs); leaves simple, mostly entire, opposite or sometimes alternate; flowers small, white or greenish, in cymes or heads (when in heads subtended by large, white, petal-like bracts in our species); calyx tube campanulate, 4-toothed; petals 4, spreading; stamens 4; ovary 2-celled, 1 ovule in each cell; stigma truncate or capitate; fruit an ovoid or globular drupe; stone 2-celled and 2-seeded. (Named from *Córnus*, a horn, alluding to the hardness of the wood.)

A genus of about 35 species, natives of the north temperate zone, Mexico, and Peru. In addition to the following, 11 others occur in North America.

1. Flowers in small umbel-like inflorescences subtended by an involucre of 4 yellowish bracts, appearing before the leaves from stalked buds of the previous season
1. *C. mas*

2. Flowers in compound cymes, terminating leafy shoots of the season; involucre wanting.
   a. Leaves alternate, crowded towards the ends of the twigs 2. *C. alternifolia*
   b. Leaves strictly opposite.
      (1) Young growth rusty pubescent; sepals 1–1.5 mm. long; style clavate 3. *C. obliqua*
      (2) Young growth not rusty pubescent; sepals 0.7 mm. long or less; style cylindrical.
         (a) Leaves round-ovate; twigs yellowish green; stems warty 4. *C. rugosa*
         (b) Leaves ovate to elliptical or lanceolate, at least twice as long as broad; stems not warty.
            m. Twigs gray; inflorescence pyramidal, about as high as broad; flower buds long ellipsoidal 5. *C. candidissima*
            n. Twigs red or red-purple, rarely yellowish; inflorescence flattened, broader than long; flower buds oval or oval-conic.
               x. Pubescence appressed throughout.
                  (x) Plants stoloniferous; sepals about as long as disk; fruit and stone mostly broader than long; style somewhat enlarged at top but constricted just below stigma 6. *C. stolonifera*
                  (y) Plant not stoloniferous; sepals shorter than the disk; fruit and stone mostly longer than broad; style not constricted just below the stigma 7. *C. alba*
               y. Pubescence of inflorescence and lower surface of leaves spreading, more or less woolly 8. *C. Baileyi*

1. Cornus mas L. Sp. Pl. 117. 1753.

CORNELIAN CHERRY

A shrub 2–5 m. high, with slender branches; young twigs grayish green, finely appressed pubescent, older twigs yellowish to reddish brown, sometimes streaked with darker lines; leaves elliptic to elliptic-ovate, 4–11 cm. long, 2–5 cm. wide, with 3–4 pairs of veins, narrowed or sometimes rounded at the base, acuminate or acute at the apex, scantily appressed pubescent above, often somewhat scabrous, lower surface with appressed hairs and also more or less woolly pubescence, particularly in the axils of the veins; petiole 5–10 mm. long, appressed pubescent; flower buds appearing the previous season, spherical, rusty pubescent, stalked, with a scaly peduncle about 5 mm. long, the inflorescence enclosed by four valvate bud scales; flowers appearing in early spring before the unfolding of the leaves; inflorescence umbel-like, subtended by an involucre formed from the four bud scales; involucral leaves yellowish, about 5 mm. long; flowers on slender, hairy pedicels about 8 mm. long; sepals minute; petals yellow, lanceolate, about 2 mm. long; fruit elliptical, about 1 cm. long, scarlet when ripe; stone ellipsoid, not ribbed. (*Mas*, the male.)

Native of central and southern Europe and Asia Minor, cultivated in southern Minnesota, especially the form with variegated leaves, f. *aureo-elegantissima*. Blossoms in April and May, fruit ripe in September and October.

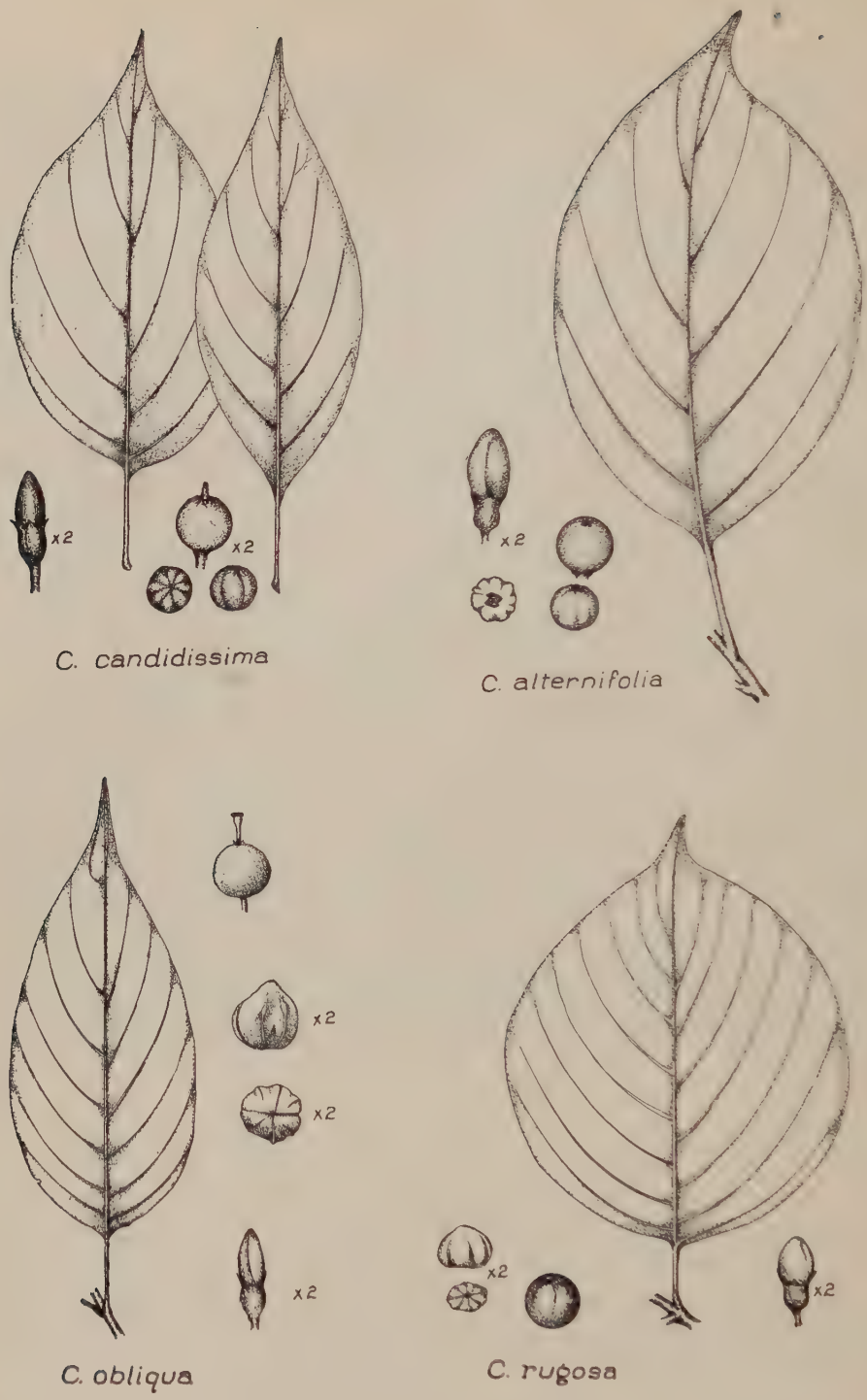
The flowering dogwood, *C. florida* has been reported from southeastern Minnesota but there is no authentic evidence of its occurrence there. It has inflorescences similar to those of *Cornus mas* but with four large white petal-like involucral bracts.

CORNUS ALBA

2. Cornus alternifolia L. f. Suppl. 125. 1781.

ALTERNATE-LEAVED DOGWOOD

A shrub or small tree 2.5–8 m. high with more or less whorled horizontal branches; bark smooth, dark or brownish on the main stem and streaked with white; young twigs yellowish green, glabrous, older twigs yellowish green to brownish; leaves alternate, clustered at the ends of the branches, elliptic-ovate to elliptic-oblong, 5–9 cm. long, 3–6 cm. wide, mostly narrowed



Cornus (Leaf, flower, bud, fruit, and stone)

at the base, acuminate at the apex, upper surface dark green with impressed veins, at first appressed pubescent, becoming nearly or quite glabrous with age, glaucous beneath, non-papillate, pubescent with scattered appressed hairs and spreading hairs along the veins; petiole slender, 1–7 cm. long; inflorescence cymose-paniculate, somewhat convex, 3–6 cm. broad; peduncle stout, 2–4 cm. long, glabrous, its branches more or less pubescent; pedicels slender, 2–5 mm. long, appressed pubescent; flower buds elliptic or obovoid; flowers white; sepals minute or nearly obsolete; petals ovate-oblong, about 3 mm. long, reflexed at anthesis; stamens somewhat exceeding the petals; style cylindrical; stigma capitate; disk inconspicuous; ovary elliptical, densely silky appressed pubescent; fruit globose, deep blue when ripe, 6–8 mm. in diameter; stone obovoid, slightly flattened and ridged and with a depression at the apex. (*Alternifólia*, alternate-leaved.)

In rich soil, woods, copses, etc. Common in the southeastern part of the state and throughout the Big Woods, less frequent northward to Pine County and westward to Hubbard County. Eastern Quebec to Minnesota, south to Georgia, Alabama, and Iowa. Blossoms in May and June, fruit ripe in August.

3. Cornus obliqua Raf. Western Review, 1: 228. 1819.

C. Purpusii Koehne, Gartenfl. 48: 338. 1899.

A shrub 1–2.5 m. high with dark to reddish brown branches; young twigs greenish gray to yellowish, densely rusty pubescent; older twigs dark purplish brown, tardily glabrate; leaves elliptic-ovate to elliptic-lanceolate, 5–8 cm. long, 1.5–4 cm. wide, narrowed or rounded at the base, abruptly and often long acuminate at the apex, upper surface dark yellow-green, finely and sparsely appressed pubescent, lower surface paler yellowish green, densely minutely papillate, finely appressed pubescent with more or less spreading pubescence along the veins and occasionally over the entire surface, the pubescence rusty only on immature leaves; petiole about 1 cm. long or less, loose pubescent; inflorescence a nearly flat cyme, 3–5 cm. in diameter, its branches spreading pubescent; flower buds long-conic; flowers 8–9 mm. in diameter, white; sepals triangular lanceolate, 1–1.5 mm. long; petals lanceolate, acute; stamens about as long as the petals; style stout, clavate, longitudinally furrowed; stigma capitate; disk reddish brown; ovary obovoid, silky white puberulent, sometimes also with more or less spreading pubescence; fruit dull blue, globose; stone broader than long, slightly flattened, oblique, irregularly and obtusely ribbed, about 5 mm. broad. (*Obliqua*, oblique, probably referring to the stone.)

Apparently scarce in the wooded parts of the southern third of the state. Quebec and Massachusetts to Minnesota and Nebraska, south to Pennsylvania, Arkansas, and Oklahoma. Blossoms in June, fruit ripe in August.

This species can be readily distinguished from all our other dogwoods by its rusty young shoots, relatively large sepals, and stout, clavate style. In *Minnesota Trees and Shrubs* (1912) it was confused with the eastern and Alleghenian *C. amomum*, from which it appears to be satisfactorily distinguished by its papillate leaves, sparser and more appressed pubescence, which is rusty only on immature leaves and shoots, and by differences in the stone.

4. **Cornus rugosa** Lam. Encycl. 2: 115. 1786.

ROUND-LEAVED DOGWOOD

C. circinata L'Her. 1788.

A shrub 1–3 m. high with yellowish green to grayish, more or less warty stems and branches; young twigs greenish, sparsely pubescent, with mostly spreading hairs; leaves broadly ovate to nearly orbicular, 6–14 cm. long, 4–10 cm. wide, with 6–8 pairs of nerves, rounded or rarely subcordate or narrowed at the base, acuminate at the apex, dark green, finely appressed pubescent and slightly hispid above, lower surface paler, bluish, and uniformly crisped pubescent; petiole 1.5–2 cm. long, appressed pubescent; inflorescence flat-topped, 4–7 cm. broad; peduncle and branches of the inflorescence rough pubescent; flower buds ovoid; flowers white, about 6–8 mm. in diameter; sepals minute or nearly obsolete; petals oblong-lanceolate, acute or rounded at the apex, reflexed at anthesis; stamens considerably exceeding the petals; style cylindrical, appressed pubescent; stigma flat capitate; disk pubescent; ovary ellipsoid, appressed puberulent; fruit globose, puberulent, white, 5–6 mm. in diameter; stone globose, bluntly ridged, about 3 mm. in diameter. (*Rugósa*, rugose, probably referring to the leaves.)

In woods and copses, usually in rich soil, common throughout the wooded districts of the state, westward in the Minnesota Valley as far as New Ulm. Quebec to Manitoba, south to Virginia, Illinois, and North Dakota. Blossoms in June, fruit ripe in August.

5. **Cornus candidissima** Marsh. Arb. Am. 35. 1785.

PANICLED DOGWOOD

C. paniculata L'Her. 1788.

A much branched shrub, usually 1.2–2 m. high, with ash gray stems and branches; young twigs brownish, nearly or quite glabrous; leaves lanceolate to narrowly ovate, 4–8 cm. long, 2–4 cm. wide, narrowed at the base, mostly long acuminate at the apex, with mostly 4 pairs of veins, margin often slightly crenulate; upper surface green and finely appressed pubescent, lower surface somewhat paler, minutely papillate and appressed pubescent; petiole slender, about 1 cm. long, nearly glabrous; inflorescence a cymose panicle, somewhat longer than broad; peduncle nearly glabrous, its branches

minutely appressed puberulent; flower buds long ellipsoidal; flowers white, about 6 mm. in diameter; sepals triangular, minute; petals lanceolate to linear-lanceolate, acute, spreading at anthesis; stamens slightly exceeding the petals; style cylindrical, sparingly pubescent; stigma capitate; disk small; ovary conspicuously silvery appressed puberulent; fruiting pedicels bright red; fruit white, globose, 5–6 mm. in diameter; stone obovoid, somewhat flattened, about 4 mm. wide, nearly smooth. (*Candidíssima*, most white, probably referring to the flowers.)

In woods and copses, common throughout the hardwood and prairie regions of the state, barely entering the coniferous forest. Maine to Minnesota, south to North Carolina and Nebraska.

6. **Cornus stolonifera** Michx. Fl. Bor. Am. 1: 92. 1803.

RED-OSIER DOGWOOD

A shrub 1–3 m. high, stems ascending, often prostrate and rooting at the base, frequently forming extensive clumps; bark of stems and branches purplish red, especially vivid in winter, rarely yellowish; young twigs green, becoming red before the close of the season, more or less finely appressed pubescent; leaves ovate to ovate-lanceolate, 5–15 cm. long, 2–6 cm. wide, with 5–7 pairs of lateral veins, narrowed or rarely rounded at the base, acuminate at the apex, upper surface bright green, sparsely and finely appressed pubescent, lower surface paler, bluish, papillate, appressed pubescent, sometimes with a few spreading hairs along the veins; petiole rather stout, 1–3 cm. long, often tinged with red, scantily pubescent; inflorescence slightly convex, 3–4 cm. in diameter; peduncle and branches pubescent; flower buds ovoid; flowers white, about 8 mm. in diameter; sepals narrowly triangular, about 0.5 mm. long; petals oblong-lanceolate, 3–4 mm. long, acute or obtuse, somewhat reflexed at anthesis; stamens slightly longer than the petals; anthers 1–1.2 mm. long; style slightly expanded at the summit but constricted below the disk-shaped stigma; disk very conspicuous; ovary somewhat whitened and appressed pubescent; fruit slightly depressed globose, 6–7 mm. in diameter, white or lead color, rarely bluish; stone usually broader than long, somewhat flattened and asymmetrical, striate. (*Stolonífera*, referring to the stoloniferous habit.)

In low, wet places, mostly common throughout the state except north of Lake Superior where it is largely replaced by *C. Baileyi*. Newfoundland to Mackenzie, south to the District of Columbia, Iowa, and Nebraska. Begins to blossom in May and continues intermittently throughout the season.

This, and the two following species are separated on very minor characters. They are regarded by Wangerin (*Pflanzenreich* 456a) as subspecies of a single collective species (*C. alba*). Further study is needed, particularly in the field, to determine the status of these forms.

7. Cornus alba L. Mant. 1: 40. 1767.

SIBERIAN DOGWOOD

C. tatarica Mill. 1768.

A shrub with mostly upright branches 1–3 m. high, not stoloniferous; twigs and branches bright red, especially during the winter season, young twigs greenish, becoming red by the end of the season, appressed pubescent; leaves elliptic-ovate or slightly obovate, with 5–6 pairs of veins, 6–11 cm. long, 2–6 cm. wide, narrowed, or somewhat rounded at the base, mostly short acuminate at the apex, yellowish green above and finely appressed pubescent, somewhat paler beneath, appressed pubescent

CORNUS STOLONIFERA CORNUS BAILEYI CORNUS ALBA

and often with a few spreading hairs along the veins, inconspicuously papillate, midvein somewhat rusty in appearance; petioles stout, sparsely pubescent, 1–2 cm. long; inflorescence flat, 4–7 cm. wide; peduncle and branches appressed pubescent; flower buds short ovoid; flowers white, 7–8 mm. in diameter; sepals almost obsolete; petals ovate, about 3 mm. long, spreading or somewhat reflexed; stamens much longer than the petals; style somewhat enlarged at the apex, stigma broad and capitate; disk very prominent; ovary appressed pubescent; fruit somewhat elliptical, white; stone mostly longer than broad, very oblique, usually acute at the base and striate. (*Álba*, white.)

Native of European Russia and northern Asia. Frequently planted.

The west American species segregated from *C. stolonifera* as *C. instolonea* A. Nelson appears not to be separable from the Old World *C. alba* L. by any reliable characters.

It seems at most to be only a geographical variety of this species. It occurs in the Dakotas and apparently enters the western portion of Minnesota.

8. Cornus Baileyi Coulter & Evans, Bot. Gaz. 15: 37. 1890.

Erect shrub 1–4 m. high, not stoloniferous; bark of stems and branches purplish red, especially vivid in winter; young twigs with a tinge of purple almost from the first, more or less loose pubescent; leaves ovate to obovate, 3–10 cm. long, 2–6 cm. wide, with 5–7 pairs of lateral veins, rounded or sometimes narrowed at the base, mostly short acuminate at the apex, upper surface dull green, rugose, with depressed veins, somewhat pubescent with appressed or more or less spreading hairs, lower surface paler, bluish, papillate, more or less woolly pubescent with long spreading hairs; petiole 0.5–1.5 cm. (rarely 2 cm.) long, finely pubescent; inflorescence slightly convex, 2–4 cm. in diameter; peduncle and branches of the inflorescence spreading pubescent; flower buds short ovoid; flowers white, about 6 mm. in diameter; sepals narrowly triangular, often with a subulate tip, 0.3–1 mm. long, very pubescent, sometimes fimbriate; petals ovate to oblong, spreading at anthesis; stamens somewhat exceeding the petals; anthers 1.3–1.5 mm. long; style cylindrical, the disk-shaped stigma wider than the style; disk prominent, closely surrounding the style; pubescence of ovary spreading or bristly, occasionally somewhat appressed; fruit white, nearly spherical; stone somewhat oblique, about as long as broad or slightly elongated, somewhat flattened, faintly furrowed. (*Baileyi*, named for L. H. Bailey.)

In swamps and moist, rocky places, chiefly in the region of coniferous forest, rare southward to the region of the Twin Cities and in the extreme southeast corner of the state. Region of the Great Lakes from western New York to Minnesota and Manitoba.

This species is almost indistinguishable from *C. pubescens* Nutt. of the Pacific Coast. Certain Minnesota specimens are fully as pubescent as any from the West. The stone in the western species is usually more strongly ribbed than in *C. Baileyi* but occasionally western specimens have stones that are indistinguishable from Minnesota material. Until further study can be made of this problem it is deemed better to retain *C. Baileyi* as the name for the Minnesota plant. Begins to blossom in May in the south and in June and July in the north, continuing throughout the summer.

CLETHRACEAE WHITE ALDER FAMILY

Shrubs or trees; leaves alternate, simple, stipules 0; flowers perfect, fragrant, in terminal racemes or panicles; calyx deeply 5-lobed, the lobes imbricate, persistent around the fruit; corolla of 5 free, imbricate petals; stamens 10–12, hypogynous, free; filaments hairy or glabrous; anthers inflexed in bud, sagittate, opening by apical pores; disk lacking; ovary superior, hairy, 3-angled or 3-lobed, 3-celled; style 1, 3-lobed at the apex, ovules numerous on axile placentas; fruit a capsule, subglobose or 3-lobed, loculicidally 3-valved; seeds numerous, compressed or trigonous, often winged.

The family includes but a single genus with about 30 species, widely distributed in subtropical and tropical Asia, Madeira, southeastern United States, Central America, and tropical South America.

CLETHRA L. Sp. Pl. 396. 1753.

Characters of the family. (*Cléthra*, the ancient Greek name for the alder.)

1. Clethra alnifolia L. Sp. Pl. 396. 1753.

SWEET PEPPER BUSH, WHITE ALDER

A shrub 1–3 m. high with brown or grayish bark; young twigs brownish, stellate puberulent; leaves wedge-obovate, 3.5–7 cm. long, 1.5–3.5 cm. wide, sometimes larger, gradually narrowed towards the base, acute or short acuminate at the apex, margin sharply serrate above the middle, mostly entire towards the base, green and glabrous or nearly so on both sides; petioles 3–12 mm. long, puberulent; flowers numerous, in erect racemes, white and fragrant, about 8 mm. across, pedicels and calyx stellate-canescent; sepals ovate-oblong, about 3 mm. long; petals oblong, about twice as long as the sepals; stamens erect, slightly exceeding the petals, filaments glabrous; style longer than the stamens, 3-lobed at the apex; capsule subglobose, about 3 mm. in diameter, loculicidal. (*Alnifólia*, leaves like the alder.)

In swamps and wet woods or sometimes in dryer situations. Native of eastern United States from Maine to Mississippi, mostly near the coast.

Occasionally planted in the state as an ornamental shrub. Blossoms in July and August.

ERICACEAE HEATH FAMILY

Shrubs or rarely herbs or trees, often evergreen; sepals 4–5, free or more or less united; petals 4–5, rarely free, usually united more or less completely; stamens usually 8 or 10, but sometimes the same in number as the petals, inserted with the petals, and free from them; anthers often appendaged, usually opening by pores; disk often present between the stamens and the pistil; ovary superior or inferior, 3–10-celled; style 1; stigma 1; fruit a capsule, either septicidal or loculicidal, a berry, or a drupe with a compound stone; seeds small.

A large family of about 90 genera and 1,400 species, several tribes of which are often segregated as families, notably those with inferior ovary as *Vacciniaceae*, and the herbaceous and nearly herbaceous forms with separate petals as *Pyrolaceae*.

1. Ovary superior.
   a. Corolla composed of separate petals.
      (1) Evergreen undershrub, scarcely woody; leaves smooth; flowers pink 1. *Chimaphila*
      (2) Low bushy evergreen; leaves very woolly beneath; flowers white 2. *Ledum*
   b. Corolla composed of plainly united petals.
      (1) Leaves deciduous; corolla bell-shaped 3. *Menziesia*

(2) Leaves evergreen.
(a) Corolla with a flat or spreading limb; stamens awnless.
x. Corolla wheel-shaped; stamens opening by pores 4. *Kalmia*
y. Corolla salver-shaped, very fragrant; stamen opening by slits 5. *Epigaea*
(b) Corolla bell-shaped or jug-shaped.
x. Anthers awnless 6. *Chamaedaphne*
y. Anthers awned.
(x) Leaves not aromatic; fruit a capsule 7. *Andromeda*
(y) Fruit fleshy.
m. Leaves aromatic; sepals plainly united at base, calyx tube becoming fleshy in fruit 8. *Gaultheria*
n. Leaves not aromatic; sepals imbricated and little connected; fruit a drupe 9. *Arctostaphylos*
2. Ovary more or less inferior; fruit fleshy.
a. Ovary half inferior; foliage aromatic, evergreen.
x. Berry red, here might be sought fruiting specimens of 8. *Gaultheria*
y. Berry white; anthers awnless, opening by slits 10. *Chiogenes*
b. Ovary wholly inferior; foliage not aromatic.
x. Ovary with ten ovules; fruit drupe-like 11. *Gaylussacia*
y. Ovary with many ovules; fruit a many-seeded berry 12. *Vaccinium*

1. CHIMAPHILA Pursh, Fl. Am. Sept. 279. 300. 1814.

Low, semiherbaceous undershrubs; stems upright from a woody, creeping rootstock; leaves evergreen, leathery; flowers small in a terminal cluster; sepals 5, persistent in fruit; petals 5, separate; stamens 10, the anthers opening by pores which are basal in the bud but become inverted in the flower; pistil 5-parted; ovary globular, 5-celled, superior; style very short; stigma disk-shaped; fruit a loculicidal capsule splitting from the top downward; seeds dust-like, very minute. (*Chimáphila*, winter-loving, referring to its evergreen habit.)

Six species of the northern hemisphere. Two others occur in the United States, one eastern, the other far western.

1. Chimaphila umbellata (L.) Nutt. var. cisatlantica Blake, Rhodora, 19: 241. 1917.

PIPSISSEWA

Low, semiherbaceous shrub, stems 1–3 dm. high; leaves alternate but crowded toward the top of each year's growth, leathery, evergreen, narrowly wedge-shaped, sharply serrate, dark green and glossy above, paler beneath, 2–6 cm. long, 0.8–2 cm. wide; petioles 3–6 mm. long, tip broadly wedge-shaped, base narrowly wedge-shaped; flowers in a 2–8-flowered corymb; peduncles bare, 6–10 cm. high; bracts very small, soon deciduous; pedicels about 1 cm. long; flowers bell-shaped; sepals very small, depressed triangular or oval, mostly broader than long, united; petals round, pink,

6–8 mm. long; stamens purplish. (*Umbellâta*, having umbels; *cisatlántica*, on this side of the Atlantic.)

In Minnesota throughout the forest districts of the northern and eastern parts, most abundant in the evergreen forests of the north; rare southward, usually in white-oak forest. Quebec and New Brunswick to Minnesota, south to Virginia. Other varieties occur in western North America, in Mexico, and in the cooler parts of the Old World. Flowers in July, fruit ripe in late autumn or winter.

The eastern *Chimaphila maculata* (L.) Pursh, with lanceolate, spotted leaves is reported from eastern and central Minnesota. There are no specimens in the University herbarium, and it probably does not reach this state.

CHIMAPHILA UMBELLATA VAR. CISATLANTICA

2. LEDUM L. Sp. pl. 391. 1753.

Erect evergreen shrubs; leaves alternate, resinous, entire; buds scaly; flowers in dense terminal clusters; sepals 5, very small, united; petals 5, free; stamens 5–10, exserted; anthers opening by terminal pores; pistil 5-parted; ovary superior; style thread-like; stigma small, capitate; fruit a septicidal 5-celled capsule, splitting up from the base. (*Lédum*, Greek name of an oriental shrub.)

A genus of three species. All occur in northern North America, one occurs also in northern Europe and Asia.

LEDUM GROENLANDICUM

KALMIA POLIFOLIA

1. Ledum groenlandicum Oeder, Fl. Dan. pl. 567. 1771.

LABRADOR TEA

Shrub, 3–10 dm. high; stems slender, brittle; bark gray; young twigs brown woolly; leaves evergreen, lanceolate, 2–8 cm. long, 5–16 mm. wide, entire, the edges rolled backwards; tip rounded, base rounded wedge-shaped; upper surface green and finely rugose, the midrib depressed and finely hairy, other veins scarcely evident; lower surface completely covered with long tawny wool; petiole about 2 mm. long; flowers white, borne in a terminal umbel-like corymb, enclosed during the previous winter in a large scaly terminal bud; axis of the cluster and pedicels hairy and glandular; pedicels thread-like, 1.5–2 cm. long; calyx minute, 5-toothed; petals narrowly ovate,

about 5 mm. long; stamens 5–7; capsule slender, pointed, about 5 mm. long, the style persistent; seeds thread-like. (*Groenlándicum*, of Greenland.)

Greenland to Alaska, south to New Jersey, the region of the Great Lakes, and the state of Washington. In Minnesota common in bogs in the northern and northeastern parts of the state, extending very little beyond the limits of the coniferous forests. Flowers usually in June, fruit ripe in August.

The leaves are said to have been used as tea by the Indians.

3. MENZIESIA J. E. Smith, Icon. Ined. 3. pl. 56. 1791.

Shrubs; leaves thin, entire, deciduous; buds very scaly; flowers small, in terminal clusters, opening with the leaves; calyx small, of four united sepals; corolla bell-shaped, of four united petals; stamens 8, included; anthers appendaged, opening by terminal pores; pistil compound, 4-parted; style thread-like; stigma 4-lobed; fruit a 4-celled capsule, septicidal, many-seeded. (*Menziésia*, named for Archibald Menzies.)

A small genus of about seven species of North America and Japan.

1. Menziesia glabella A. Gray, Syn. Fl. 2[1]:39. 1878.

Bark grayish brown, shreddy; leaves obovate, 3–7 cm. long, 1–3 cm. wide, petioled, entire, light green above, pale and glaucous below, finely and sparsely rough hairy, tips obtuse wedge-shaped, very slightly bristle-tipped, base narrowly wedge-shaped; flowers in a terminal sessile umbel: pedicels thread-like, about 3 cm. long, flowers about 7 mm. long; calyx barely lobed, ciliate; corolla brownish; seeds thread-like; foliage with a skunk-like odor. (*Glabélla*, somewhat smooth.)

British Columbia to Oregon and Montana. Reported from Minnesota Point, Duluth. It possibly occurs in the northeastern corner of Minnesota but there are no specimens in the herbarium of the University. Flowers in May.

4. KALMIA L. Sp. Pl. 391. 1753.

AMERICAN LAUREL

Erect shrubs, sometimes very dwarf; leaves entire, leathery, evergreen; buds naked; sepals 5, united at base; corolla flat, wheel-shaped, of five united petals furnished with ten small pouches in which the anthers are situated in the bud and in the newly opened flower; stamens 10; anthers without appendages, opening by terminal pores; pistil 5-parted; ovary superior; style thread-like; stigma slightly enlarged; fruit a 5-celled capsule, septicidal, many-seeded; seeds small, round. (*Kálmia*, named for Peter Kalm, a pupil of Linnaeus.)

A genus of six species of North America and Cuba. Only the following species reaches as far west as Minnesota.

1. Kalmia polifolia Wang. Beob. Ges. Naturf. Freunde, Berlin, 2^2: 130. 1788.

SWAMP LAUREL

Kalmia glauca Ait. 1789.

Low shrub 1–6 dm. high; twigs with ridges running down from the bases of the leaves; leaves opposite, sessile, ovate, lanceolate or linear, 1–3 cm. long, 2–10 mm. wide, evergreen, leathery, dark green and glossy above, white beneath, margins entire and rolled backwards, midrib prominent beneath, tip blunt-pointed, base tapering; flowers in terminal umbel-like clusters; pedicels thread-like, erect, about 15 cm. long; sepals ovate, persistent; corolla pink-purple, about 1.5 cm. across; capsule globose, about 5 mm. in diameter. (*Polifólia*, smooth-leaved.)

Newfoundland and Labrador to Alaska, southward to New Jersey, Michigan, Colorado, and California. In Minnesota in bogs, most abundant in the northeastern part of the state, apparently not reaching beyond the region of coniferous forests. Flowers in June, fruit ripe about August 1. (See cut, p. 307.)

EPIGAEA REPENS

5. EPIGAEA L. Sp. Pl. 395. 1753.

Prostrate semiherbaceous undershrubs; leaves evergreen, alternate, or crowded and nearly opposite; flowers in terminal clusters from scaly buds; sepals 5, large, persistent; petals 5, united to form a salver-shaped corolla; stamens 10, not exserted; ovary 5-lobed, 5-celled; style columnar; stigma 5-lobed; fruit a fleshy capsule, finally loculicidal; seeds oval. (*Epigaéa*, Gr., upon the ground.)

A genus of two species; the other is Japanese.

1. Epigaea repens L. Sp. Pl. 395. 1753.

TRAILING ARBUTUS

Leaves petioled, elliptical, 3–6 cm. long, 2–4 cm. wide, rough hairy, tip round, base round or heart-shaped; flowers pink, very fragrant; sepals lanceolate, about 7 mm. long; corolla 1 cm. across, corolla tube about 1 cm. long. (*Répens*, creeping.)

In Minnesota common in the northeastern and northern parts in sandy evergreen forest, extending as far southwest as the head waters of the Mississippi. Newfoundland to Saskatchewan, south to Florida, Kentucky, and Minnesota. Flowers in earliest spring.

6. CHAMAEDAPHNE Moench, Meth. 457. 1794.

An erect shrub, branches slender, stiff; buds scaly; leaves alternate petioled, leathery, scurfy, evergreen; flowers in leafy racemes, with two small bractlets just below the calyx; sepals 5, separate; corolla cylindric, of 5 united petals; stamens 10, included in the corolla; anthers not awned, the sacs elongated above into long tubes with terminal pores; pistil of five united carpels; ovary superior, 5-celled; style straight; stigma unlobed; fruit a globose capsule surrounded by the persistent calyx, loculicidal, the inner layer of the pericarp separating from the outer layer and splitting into 10 valves; seeds small, numerous. (*Chamaedáphne*, Gr. *chamae*, upon the ground, *daphne*, a kind of shrub.)

A monotypic genus.

1. Chamaedaphne calyculata (L.) Moench, Meth. 457. 1794.

LEATHER LEAF

An evergreen shrub 3–10 dm. high; leaves oblong, with scurfy, scale-like hairs, apex pointed, base rounded, 0.5–4 cm. long, 2–15 mm. wide, those of the inflorescence smallest; flowers white, about 5 mm. long. (*Calyculáta*, cup-like.)

Bogs, very abundant in the region of coniferous forests where it often covers acres of muskeg with a nearly pure growth, common southward in the edge of tamarack swamps as far as the Twin Cities, and rarely in open, peaty swamps as far as Faribault. Not known from the prairie region, the "Big Woods," or the southeastern corner of the state. Labrador to Alaska, Siberia and Scandinavia, south to northern Indiana, Minnesota, and British Columbia, and in the mountains to Georgia.

CHAMAEDAPHNE CALYCULATA

7. ANDROMEDA L. Sp. Pl. 393. 1753.

Small, upright shrubs; buds very small, scaly; leaves evergreen, alternate; flowers in terminal clusters; sepals 5, pointed, united at the base; petals 5, almost completely united to form a jug-shaped corolla; stamens 10, included; anthers awned, opening by terminal pores; ovary 5-celled, superior; style short, straight, columnar; stigma terminal, unlobed; fruit a subglobose capsule, loculicidal, many-seeded, seeds small, flat, oval. (*Andrómeda*, a mythological name.)

A genus of two closely related species, one Arctic, the other of northeastern North America, with which are often included the twelve species of *Pieris* of eastern Asia and eastern North America. Only the following species is known in Minnesota.

1. Andromeda glaucophylla Link, Enum. Hort. Berol. 1: 394. 1821.

Shrubs 0.5–4 dm. high, from a creeping base; bark of young shoots brown, of older shoots gray; leaves linear, 2–5 cm. long, 2–5 mm. wide, leathery, nearly sessile, margins rolled back, dark green above, white and finely hairy beneath, tip acute, base wedge-shaped, midrib prominent; flowers in small terminal umbel-like clusters, white, about 4 mm. long; pedicels 3–5 mm. long, curved, glaucous; capsule depressed, globular, indented on top. (*Glaucophýlla*, glaucous-leaved.)

In Minnesota common in bogs in the northern and eastern parts of the state, most abundant in the region of coniferous forests, but extending south as far as Minneapolis. Labrador to Manitoba, south to New Jersey and Minnesota. This species has been much confused with the more northern circumpolar *A. polifolia* L. Flowers in June, fruit ripe about August 1.

ANDROMEDA ARCTOSTAPHYLOS GAULTHERIA

8. GAULTHERIA L. Sp. Pl. 395. 1753.

Shrubs, stems creeping or erect; leaves leathery, evergreen, usually alternate; flowers solitary or clustered; sepals 5, more or less united, the calyx surrounded by a few small scale-like bracts; corolla narrowly bell-shaped, composed of five united petals; stamens 10, included in the corolla; filaments somewhat thickened; anthers opening by terminal pores, awned; ovary superior, 5-lobed, 5-celled; style somewhat thick, straight; stigma entire; fruit a more or-less fleshy capsule, surrounded by the thick and fleshy calyx; seeds minute. (*Gaulthéria*, named for Dr. Hugues Gaultier, a court physician at Quebec in the 18th century.)

About 100 species of wide geographical distribution, most abundant in the cooler parts of the southern hemisphere, especially in the Andes, three species in western North America, one in Japan, ten in southeastern Asia. Only the following species occurs in Minnesota.

1. Gaultheria procumbens L. Sp. Pl. 395. 1753.

WINTERGREEN, CHECKERBERRY

Low, creeping, almost herbaceous aromatic shrub, about 1 dm. high; leaves petioled, evergreen, alternate, crowded near the tops of the branches,

smooth, upper sides dark glossy green, lower sides paler, margins obscurely serrate with bristle-tipped teeth, tip rounded or obtusely wedge-shaped, base wedge-shaped, 2–5 cm. long, 1–2.5 cm. wide; flowers white or pale pink, axillary, solitary; peduncles about 5 mm. long; bracteoles 2 or 3, close under the calyx; calyx wheel-shaped, 5-pointed; corolla jug-shaped, 5–8 mm. long, the tips of the petals triangular; anthers with four terminal awns; fruit scarlet, round, 5–10 mm. in diameter, composed chiefly of the fleshy calyx, surrounding a nearly dry capsule, style persistent. (*Procúmbens*, creeping.)

In Minnesota very abundant as an undershrub in dry evergreen woods of the northern and northeastern parts of the state. Newfoundland to Manitoba, south to Georgia, Michigan, and Minnesota. Flowers in August, fruit ripening the next summer.

All parts of the plant, but especially the leaves and fruit, contain the fragrant oil of wintergreen; commercially, however, this oil is most frequently obtained from the twigs of the black birch (*Betula lenta*). It is also made synthetically.

9. ARCTOSTAPHYLOS Adans. Fam. Pl. 2: 165. 1763.

BEARBERRY

Shrubs or small trees; leaves alternate, petioled, leathery, evergreen; flowers in terminal clusters; sepals 4–5; corolla bell-shaped or jug-shaped of 4–5 united petals; stamens 8 or 10, included in the corolla; anthers awned on the back, opening by terminal pores; pistil 4–5-parted; ovary superior, 4–5- or 8- or 10-celled with one ovule in each cavity; style slender; stigma terminal; fruit a drupe, with 4–10 coherent stones, the calyx persisting unchanged in the fruit. (*Arctostáphylos*, Gr. bearberry, *arctos*, a bear, *staphyle*, a grape.)

About twenty species. The following occurs in all the northern parts of the northern hemisphere, the others in western North America, where they are commonly called "Manzanita."

1. Arctostaphylos Uva-ursi (L.) Spreng. Syst. 2: 287. 1825.

BEARBERRY

Trailing shrub, the branches often a meter or more long, but rising scarcely 1 dm. from the ground; bark gray and scaly, becoming finally smooth and red-brown; leaves alternate, petioled, leathery, evergreen, dark green, glossy, and finely reticulate above, rough and for a time hairy beneath and on the margins, tip round or bluntly angled, base narrowly wedge-shaped, margin entire, leaves 1–1.5 cm. long, 5–7 mm. wide, petioles about 2 mm. long; flowers in small terminal clusters, peduncles about 2 mm. long, recurved, flowers pale pink, corolla narrowly jug-shaped, about 4–7 mm. long; drupe globose, 5–10 mm. in diameter, scarlet, rather dry and scarcely

edible, the stone composed usually of 5 coherent nutlets. (*Úva-úrsi*, bearberry.)

A polymorphic, circumboreal species. Three varieties may be recognized in Minnesota, distinguished most readily by their pubescence.

KEY TO THE VARIETIES OF ARCTOSTAPHYLOS UVA-URSI

1. Pubescence without stalked, glandular hairs.
   a. Young twigs puberulent and viscid, the puberulence soon disappearing
      1. typical *A. Uva-uris*
   b. Young twigs not viscid, persistently canescent tomentulose
      1a. *A. Uva-ursi* var. *coactilis*
2. Pubescence with stalked, glandular hairs 1b. *A. Uva-ursi* var. *adenotricha*

1. Typical **A. Uva-ursi** (L.) Spreng.

Twigs and petioles minutely puberulent and viscid, the puberulence soon disappearing; leaves thicker and firmer than in the following varieties, glabrous except the margins, which are often minutely tomentulose, upper surface very glossy, rugose veiny, apex of leaf mostly rounded; corolla ovoid, or broad conical, about 5–6 mm. long, 3–4 mm. wide.

On nearly pure sand and granitic rocks, in the northeastern part of the state as far south as Brainerd, also in several stations in the southeast corner of the state. Greenland to Alaska and Scandinavia; in America south to Newfoundland, Quebec, northern Indiana, Minnesota, the Black Hills, New Mexico, and Washington.

1a. A. Uva-ursi var. **coactilis** Fernald & Macbride, Rhodora, 16: 212. 1914.

Twigs and petioles finely and permanently tomentulose, not viscid; leaves slightly pubescent at base and along the midrib, margin distinctly tomentulose, veining often obscure on the upper side, apex mostly blunt-angled; bud scales dark brown, glabrous except on the margin; flowers as in the typical form.

On sandy soil in the region of coniferous forests as far west as Lake Itasca and south to Anoka County, also in a few stations in the southeastern corner of the state. Newfoundland to Manitoba, south to southern New England, Illinois, and Minnesota, and in the mountains to Virginia, also reported from the western mountains from the Yukon to Colorado and California. It seems, however, to the authors that much or all of the western material will have to be excluded from this variety.

1b. A. Uva-ursi var. **adenotricha** Fernald & Macbride, Rhodora, 16: 213. 1914.

Twigs and petioles viscid villous, the pubescence intermixed with stout gland-tipped hairs (often black); leaves dark green, rather dull, somewhat thinner than in the typical form, upper surface puberulent towards the base, lower surface persistently puberulent, margin distinctly tomentulose, apex

rounded; bud scales conspicuous, pale; flowers usually very small, 3–3.5 mm. long by 2–3 mm. wide. (*Adenotricha*, glandular-haired.)

Across the northern part of the state, apparently more common westward where it extends beyond the forested area into the Red River Valley, also known from a single station near Lake City, Wabasha County. Its distribution suggests that it is more calciphile than the other varieties. North coast of the Gulf of St. Lawrence, Minnesota, the Black Hills, Wyoming, Montana, and northwestward to British Columbia.

10. CHIOGENES Salisb. Trans. Hort. Soc. Lond. 2: 94. 1815.

Creeping semiherbaceous, evergreen, aromatic shrubs; leaves small, thin, leathery, alternate; flowers solitary, axillary, furnished with two bractlets close under the calyx; sepals 4, united, and fused with the lower part of the ovary; corolla bell-shaped, composed of four united petals; stamens 8, included in the corolla; anthers not awned, opening by short slits; pistil of

GAYLUSSACIA CHIOGENES

four united carpels; ovary partly inferior, 4-celled; style straight, short; stigma terminal; fruit a fleshy berry, the ovary becoming entirely inferior; seeds numerous, small. (*Chiógenes*, Gr. *Chion*, snow, *genes*, born, in allusion to the white berries.)

A monotypic genus.

1. Chiogenes hispidula (L.) T. & G. in Torr. Fl. N. Y. 1: 450. 1843.

CREEPING SNOWBERRY

Stems and lower sides and margins of leaves brown, strigose; leaves elliptical, 5–9 mm. long, 4–7 mm. wide, finely rugose above, leaf margin revolute, apex obtuse with a short projecting point, base wedge-shaped; petiole 1 mm. long; flowers about 4 mm. long; berry white, about 8 mm. in diameter. (*Hispídula*, somewhat bristly.)

In Minnesota common in wet coniferous forests of the northern and northeastern parts of the state, extending south in tamarack swamps as far as the Twin Cities. Labrador and Newfoundland to British Columbia, south to North Carolina, Michigan, and Minnesota. Also in Japan.

11. GAYLUSSACIA H. B. K. Nov. Gen. 3: 257. 1819.

Shrubs; leaves alternate; flowers in racemes; sepals 5, united at the base and fused with the ovary; corolla urn-shaped or bell-shaped, composed of five fused petals; stamens 10, usually included in the corolla; anthers without awns, prolonged upward into 2 tubes and opening by apical pores; pistil of 5 united carpels; ovary inferior, 10-celled through the development of false partitions, each cell with one ovule; style straight, thread-like; stigma terminal, scarcely lobed; fruit a berry-like drupe with ten stones, which are more or less solidly grown together. (*Gaylussácia*, named for the chemist, Gay-Lussac.)

About 40 species, all American and for the most part South American; about 5 occur in eastern North America.

1. Gaylussacia baccata (Wang.) K. Koch, Dendrol. 2: 93. 1872.

HUCKLEBERRY

Gaylussacia resinosa (Ait.) T. & G. 1843.

Branching shrub, 3 dm.–1 m. high; stems stiff, gray, young twigs hairy; leaves alternate, ovate or ovate-lanceolate, 2–4 cm. long, 1–1.7 cm. wide, tough and somewhat leathery, resin-dotted, smooth except for slight hairiness on the margin and along the larger veins, green on both sides, somewhat pale below, margin entire, tip acute or rounded, base wedge-shaped; petiole about 1 mm. long; flowers in small lateral racemes from scaly winter buds; peduncles and pedicels resinous-dotted; pedicels about 6 mm. long; calyx tube hemispherical, free tips of sepals broadly triangular; corolla tubular bell-shaped, 5-sided, reddish, 3–4 mm. long, about 2 mm. wide; stamens included; filaments short, hairy; fruit black, about 6 mm. in diameter, edible. (*Baccáta*, having berries.)

Dry and acid sandy soil. In Minnesota apparently very rare, barely entering the eastern border of the state; there are specimens in the herbarium of the University from near Winona, and from Ramsey and Washington counties in the vicinity of St. Paul; it is also reported near Duluth. Newfoundland to Manitoba, south to Georgia and Kentucky. Flowers in May and June, fruit ripe in late summer.

12. VACCINIUM L. Sp. Pl. 349. 1753.

BLUEBERRY, CRANBERRY

Shrubs, sometimes semiherbaceous; leaves alternate, deciduous or evergreen, in the latter case leathery; flowers solitary in the axils of the leaves or

in terminal or lateral racemes; sepals 5 (or 4), united at the base and fused with the ovary; corolla of 5 (or 4) united petals, variously shaped; stamens 10 (or 8), anthers with or without awns, prolonged upward into two tubes and opening by apical pores; pistil of 5 (or 4) united carpels, ovary inferior 5- (or 4-) celled, or by false partitions 10- (or 8-) celled, each cell with several ovules; style straight; stigma small; fruit a many-seeded berry. (*Vaccinium*, classical Latin name for the blueberry.)

A genus of over a hundred species distributed throughout the boreal regions and thence southward into the warm temperate regions and the mountainous parts of the tropics. Several of the subgenera are often regarded as genera.

KEY TO SECTIONS OF GENUS VACCINIUM

1. Leaves deciduous; corolla cylindrical, bell-shaped, jug-shaped, or globular.
   a. Anthers awned; berry 4- or 5-celled — *Eu-vaccinium*
   b. Anthers not awned; berry 8- or 10-celled — *Cyanococcus*
2. Leaves leathery and evergreen.
   a. Corolla bell-shaped, petals plainly united — *Vitis-Idaea*
   b. Corolla consisting of reflexed, nearly separate petals — *Oxycoccus*

KEY TO THE SPECIES

SECTION EU-VACCINIUM—BILLBERRIES

Free limb of calyx collar-like, often with scarcely any lobes; corolla bell-shaped, or globular; stamens included, anthers awned; berry 4- or 5-celled, blue, black, or red; leaves deciduous.

(1) Parts of the flower mostly in fours; leaves entire, thick — 1. *V. uliginosum*
(2) Parts of the flower in fives; leaves serrate, thin — 2. *V. caespitosum*

SECTION CYANOCOCCUS—BLUEBERRIES

Free limb of calyx deeply lobed; corolla bell-shaped to cylindrical; stamens included, anthers not awned; berry more or less completely 10-celled (rarely 8-celled), blue, black, or sometimes whitish; leaves deciduous.

(1) Leaves finely serrate, nearly smooth; twigs warty, nearly glabrous — 3. *V. pennsylvanicum*
(2) Leaves entire; twigs and leaves densely hairy — 4. *V. canadense*

SECTION VITIS-IDAEA—MOUNTAIN CRANBERRY

Free limb of calyx deeply lobed; corolla bell-shaped; stamens included, anthers not awned; berry 4-celled, red; leaves evergreen — 5. *V. Vitis-Idaea* var. *minus*

SECTION OXYCOCCUS—CRANBERRIES

Free limb of calyx deeply lobed; corolla reflexed, deeply cleft or of almost or quite separate petals; stamens exserted, not awned, berry 4-celled, red; our species prostrate evergreen shrubs with very small leaves.

(1) Leaves ovate, acute; fruit less than 1 cm. in diameter — 6. *V. Oxycoccos*
(2) Leaves elliptical, obtuse; fruit more than 1 cm. in diameter — 7. *V. macrocarpon*

1. Vaccinium uliginosum L. Sp. Pl. 350. 1753.

BILLBERRY

Low, much branched bush; stems upright, 8–60 cm. high, 1–3 mm. in diameter, stiff, smooth, round, dark purplish gray after the shedding of the thin whitish epidermis; leaves deciduous, somewhat thick and firm, obovate or nearly round, veiny, 9–15 mm. long, 2.5–10 mm. wide, sometimes nearly double this size in the far north, upper side dull green, smooth; lower side paler, slightly hairy; margin slightly revolute, entire; apex rounded, indented, or broadly wedge-shaped; base wedge-shaped; petioles 1 mm. long

VACCINIUM ULIGINOSUM

VACCINIUM CAESPITOSUM

or wanting; flowers solitary or in groups of 2–4 from special scaly winter buds; sepals 4 (rarely 5), their free tips broadly triangular and very obtuse; corolla globular bell-shaped, pink, composed of 4 (rarely 5) petals, which are fused about two-thirds of their length; stamens 8 (rarely 10), included, filaments smooth, anthers each bearing two long awns on the back, the sacs tapering upward into short tubes with terminal pores; style shorter than the corolla; berry 4-celled (rarely 5-celled), bluish black with a bloom, sweet and edible. (*Uliginósum*, marshy, i.e., growing in moist places.)

Moorland, heaths, and rocks, Arctic regions of both the Old and New Worlds, south to northern New England, Lake Superior, Washington, the Alps, and England. In Minnesota it occurs only in the extreme northeast corner along the shore of Lake Superior. Flowers about July 1.

2. Vaccinium caespitosum Michx. Fl. Bor. Am. 1: 234. 1803.

DWARF BILLBERRY

Dwarf tufted shrub; stems upright, branched, 5–30 cm. high, 0.5–3 mm. in diameter, stiff, round, finely pubescent, grayish brown; leaves deciduous,

thin, obovate, or spatulate, veiny, smooth and green on both sides, margin finely serrate, tip rounded or abruptly wedge-shaped, base narrowly wedge-shaped, 10–20 mm. long, 3–10 mm. wide, rarely considerably larger; petioles 1 mm. long or wanting; flowers solitary from the axils of the lower leaves of the new growth, drooping; pedicels 2–3 mm. long; sepals 5, almost completely united, their upper portion forming a free collar-like projection, which is very slightly and obtusely 5-lobed; corolla bright pink or red, jug-shaped, about 5 mm. long, composed of 5 petals, which are united almost to the tip; stamens 10, included in the corolla, filaments smooth, anthers each bearing two long awns on the back, their sacs tapering upward into rather long tubes with terminal pores; style straight, about as long as the corolla; berry 5-celled, blue-black with a bloom, sweet and edible. (*Caespitósum*, sod-like.)

In Minnesota locally abundant in the region of coniferous forest, westward as far as Lake Itasca, apparently more abundant westward. Labrador to Alaska, south to Northern New England, Wisconsin, Minnesota, Colorado, and California. Blossoms from May to July, fruit ripe in August.

3. **Vaccinium pennsylvanicum** Lam. Encycl. 1: 74. 1783.

BLUEBERRY

Low, upright shrub; stems 2–6 dm. high, twigs green, warty, glabrous except for 2 narrow puberulent lines running down from each node; leaves deciduous, thin, lanceolate, 1.5–3.5 cm. long, 0.5–1.5 cm. wide; apex acute; base wedge-shaped; margin finely serrulate, the teeth bristle-tipped; upper surface glabrous except for minute puberulence along the midrib; lower surface glabrous, or with a few hairs on the midrib; petioles about 1 mm. long; flowers in terminal or lateral racemes or panicles from scaly winter buds, appearing with or rarely before the leaves; bracts broadly oval, reddish; pedicels about 1 mm. long; sepals 5, united, thin, the free portion somewhat acute, about 1 mm. long; corolla narrowly campanulate, jug-shaped or nearly spherical, white or pale pink, 4–5 mm. long, consisting of 5 petals united almost to their tips; stamens 10, included in the corolla, filaments slightly hairy, usually a little shorter than the anthers, anthers without awns, the sacs prolonged upward into narrow tubes with terminal pores; style straight, slightly exserted; berry 10-celled, blue with a bloom, sweet and edible. (*Pennsylvánicum*, Pennsylvanian.)

Typical *V. pennsylvanicum* occurs in Minnesota in dry, acid soil, very abundant northwards, and in the eastern part of the state as far south as the Twin Cities. Several stations occur farther south in the vicinity of Lake Pepin, and in the southeastern corner of the state. Newfoundland to Saskatchewan, southwards to Virginia, Illinois, and Minnesota. Flowers in May and early June, fruit ripe in July except in the far north where it ripens in August and September.

The most abundant blueberry in Minnesota, as well as the best in quality, and the earliest to ripen. In addition to the typical form two varieties occur within the state.

VACCINIUM PENNSYLVANICUM

3a. V. pennsylvanicum var. **nigrum** Wood, Bot. and Flor. 199. 1873.

Differs from the species in having black berries with but little bloom; leaves usually somewhat thicker than in the type and glaucous beneath. (*Nigrum*, black.)

In Minnesota much less abundant than the type, most abundant northwards. General range similar to the type but not extending so far north and west.

3b. V. pennsylvanicum var. **myrtilloides** (Michx.) Fernald, Rhodora, 10: 148. 1908.

Lower surface of leaves strongly pubescent along the midrib and sometimes on the other veins as well, petioles and twigs more pubescent than in the type. The extreme forms are as pubescent as *V. canadense* from which they may be distinguished by the serrated leaf margins and sweeter berries. It seems probable that some of the forms classified here are hybrids between *V. pennsylvanicum* and *V. canadense*. (*Myrtilloides*, myrtle-like, referring to the leaves.)

In the northeastern part of the state, as far southwest as the Twin Cities; one station in southeastern Minnesota, at Gwinn's Bluff, Winona County. Labrador to Hudson Bay, south to Newfoundland, Nova Scotia, Massachusetts, and Minnesota.

VACCINIUM PENNSYLVANICUM VACCINIUM CANADENSE

4. Vaccinium canadense Kalm, ex Richards. Bot. App. Frankl. Journ. ed. 2. 12. 1823.

BLUEBERRY

Low, upright shrub; stems 2–6 dm. high, greenish brown, finely warty and densely woolly pubescent; leaves deciduous, thin, lanceolate or ovate,

bright green, hairy below and along the veins above; margin entire, apex acute to rounded, base broadly wedge-shaped or rounded; leaves 15–35 mm. long, 7–15 mm. wide; petioles about 1 mm. long; flowers in terminal or lateral, few-flowered racemes from scaly winter buds, opening with the leaves; bracts lanceolate, early deciduous; pedicels 2–5 mm. long; sepals 5, their free tips triangular, acute, about 1.5 mm. long; corolla of 5 petals, united nearly to the tips, white, streaked with pink, narrow bell-shaped, or somewhat constricted at the throat, about 4 mm. long, free tips of the petals about 1 mm. long, not spreading; stamens 10, included in the corolla, filaments hairy, about as long as the anthers, anthers without awns, the sacs prolonged upwards into tubes with terminal pores; style not exserted; berry 10-celled, blue with a bloom, edible, but rather sour. (*Canadénse*, Canadian.)

Dry, sandy soil, often in pine and oak woods, occasionally in bogs; in the northern part of the state and in the eastern part as far south as Minneapolis, less abundant than *V. pennsylvanicum*. Labrador to Manitoba and British Columbia, south to Pennsylvania, central Illinois, and Minnesota. Flowers in May and June, fruit ripe in August, or in the extreme north in September. A much less desirable fruit than *V. pennsylvanicum*.

5. Vaccinium Vitis-Idaea L. var. **minus** Lodd. Bot. Cab. 11. pl. 1023. 1825.

MOUNTAIN CRANBERRY

Dwarf, matted shrub; stems creeping, upright branches stiff, 2–15 cm. high, about 1 mm. in diameter; leaves evergreen, leathery, broad elliptical; upper side dark green, glossy, lower pale and with more or less black bristly dots; margin entire or finely crenate, revolute; apex rounded or indented, base wedge-shaped; leaves 5–18 mm. long, 3–9 mm. wide; petioles about 2 mm. long; flowers in terminal racemes from scaly winter buds; bracts thin, ovate, about 3 mm. long, green or reddish; pedicels about 2 mm. long, furnished with two bractlets resembling the bracts; sepals 4, their free tips triangular, acute, glandular along the margin, about 1 mm. long; corolla pink, bell-shaped, about 5 mm. long, composed of 4 petals united about half their length; stamens 8, included, filaments hairy, short, anthers without awns, their sacs elongated upward into tubes with terminal pores; style curved, slightly exserted; berry dark red, 4-celled, acid and scarcely edible unless cooked. (*Vítis-Idaéa*, probably "vine of the wood," an ancient name of unknown application; *mínus*, smaller.)

Locally very abundant in sphagnum swamps in the far northern part of the state, less commonly on granite ledges along Lake Superior. Arctic regions of America and Asia, south to Massachusetts, Lake Superior, and the alpine regions of British Columbia. The larger typical form occurs in northern Europe. Flowers in June and July, fruit ripe in the autumn.

The berries, "Preiselbeeren," "Tyttebaer," are much used for cooking in parts of northern Europe. There seems to be no reason why they should not be similarly em-

ployed here. They sometimes appear in our markets, but are mostly shipped into the state from Newfoundland and Norway.

6. Vaccinium Oxycoccos L. Sp. Pl. 351. 1753.

SMALL CRANBERRY

Oxycoccus palustris Pers. 1805.
Oxycoccus Oxycoccus MacMillan, 1892.

Creeping, prostrate shrub; stems very slender, about 0.5 mm. in diameter; leaves leathery, evergreen, ovate-lanceolate, 4–12 mm. long, 2.5–3.5 mm. wide; upper side dark green, glossy, under side nearly white; margin

Vaccinium Vitis-Idaea Vaccinium Oxycoccos Vaccinium macrocarpon

with a few small teeth, strongly revolute; apex wedge-shaped, acute; base truncate or slightly heart-shaped; petioles slender, about 1.5 mm. long; flowers in small terminal racemes of 1–5, the axis of the raceme usually very short (2–5 mm.), but occasionally prolonged upwards into a leafy shoot and then the flower-bearing part often 1 cm. long; bracts about 1.5 mm. long, broadly elliptical, obtuse; pedicels thread-like, red, 2–4 cm. long, bearing 2 minute reddish bractlets; sepals 4, their free tips broadly triangular, obtuse; petals 4, lanceolate, 5–8 mm. long, separate almost to the base, spreading or reflexed, pink; stamens 8, exserted, filaments hairy, anthers without awns,

the anther sacs prolonged upward into long tubes with terminal pores; style straight, slightly longer than the stamens; fruit red, less than 1 cm. in diameter, sour and nearly inedible when raw, pleasant when cooked. (*Oxycóccos*, sour berry.)

Sphagnum bogs, tundra, and wet, sour soil, generally. Arctic regions, southward to North Carolina, Michigan, Minnesota, British Columbia, Japan, and Central Europe. In Minnesota it occurs in sphagnum bogs of the northern part of the state, extending in tamarack swamps to the region about the Twin Cities. Flowers in June, fruit ripe in late fall.

7. Vaccinium macrocarpon Ait. Hort. Kew. 2: 13. 1789.

LARGE CRANBERRY

Oxycoccus macrocarpus Pers. 1805.

Creeping, prostrate shrub; stems slender, often a meter long, about 1–1.5 mm. in diameter, flowering branches more or less erect; leaves leathery, evergreen, elliptical, 6–15 mm. long, 2.5–5 mm. wide; upper side dark green, glossy, under side paler, glaucous; margin entire, slightly revolute; apex rounded, base rounded; petioles slender, about 1.5 mm. long; flowers in raceme-like clusters of 1–10, the axis of the raceme 1–3 cm. long and prolonged upward into a leafy shoot; bracts 2–4 mm. long, ovate; pedicels thread-like, red, 2–4 cm. long, bearing two small green leaf-like bractlets above the middle; sepals 4, their free tips broadly triangular, obtuse; petals 4, lanceolate, 6–10 mm. long, separate almost to the base, spreading or reflexed, pink; stamens 8, exserted, filaments hairy, very short, anthers without awns, the anther sacs prolonged upward into long tubes with terminal pores; style straight, slightly longer than the stamens; fruit red, 1–2 cm. in diameter, sour and nearly inedible when raw, pleasant when cooked. (*Macrocárpon*, large-fruited.)

Most abundant along the edges of tamarck swamps and bogs in the east and the east central part of the state extending as far southwest as Blue Earth County, and as far northwest as Otter Tail County and Lake Itasca, scarcely entering the region of coniferous forest. Newfoundland and New England, Lake Erie and Minnesota, south to Virginia and Arkansas. Flowers in June, fruit ripe in the fall.

The commom cranberry of commerce, much cultivated in Wisconsin, less frequently in Minnesota. It should do well in bogs in the region north of Minneapolis and east of the Mississippi River.

OLEACEAE, OLIVE FAMILY

Trees or shrubs with simple or pinnately compound, opposite leaves; flowers perfect, polygamous, dioecious or monoecious; sepals 4, more or less united or wanting, corolla regular, of 4 (rarely 5 or 6) united or nearly free petals, or wanting; stamens 2, inserted on the corolla tube or hypogynous;

carpels 2, united; style 1, stigmas 2, ovary 2-celled, with 2 (rarely 4–8) ovules in each cell; fruit a capsule, berry, drupe or samara, 1–few-seeded.

A family of 21 genera and about 400 species, mostly of the warm temperate regions and the Old World tropics.

1. Large trees with odd-pinnate leaves; flowers apetalous; fruit a samara 1. *Fraxinus*
2. Shrubs or small trees with simple (rarely trifoliolate) leaves; flowers with a conspicuous corolla.
   a. Petals linear, barely united at the very base 2. *Chionanthus*
   b. Petals united to about the middle or higher.
      (1) Corolla salver-shaped or funnel-shaped, white or yellowish white to purple 3. *Syringa*
      (2) Corolla campanulate, yellow 4. *Forsythia*

1. FRAXINUS L. Sp. Pl. 1057. 1753.

ASH

Trees with opposite odd-pinnate leaves (rarely simple in some exotic species); flowers small, in clusters, dioecious or polygamous, appearing before or with the leaves from separate winter buds; calyx of 4 united sepals or irregularly lobed or entire or lacking; petals 4, more or less united at the base, or lacking (in all our species); stamens 2 (rarely 3–4); ovary 2-celled with 2 ovules in each cell; stigma 2-cleft; fruit an elongated 1-seeded samara. (*Fráxinus*, the classical Latin name of the ash tree.)

About 60 species of the north temperate zone.

1. Lateral leaflets more or less stalked; calyx present; body of samara terete; bark ridged.
   a. Body of samara elliptical, wing terminal; leaves pale beneath 1. *F. americana*
   b. Body of samara long cylindrical, wing extending down the sides; leaves green on both sides.
      (1) Twigs and rachis of leaves pubescent 2. *F. pennsylvanica*
      (2) Twigs and rachis of leaves glabrous 2a. *F. pennsylvanica* var. *lanceolata*
2. Lateral leaflets sessile; calyx wanting; body of samara flattened; bark flaky, without deep ridges. 3. *F. nigra*

1. Fraxinus americana L. Sp. Pl. 1057. 1753.

WHITE ASH

A large tree reaching a maximum height of 40 m. and a trunk diameter of nearly 2 m.; bark of trunk grayish brown, deeply furrowed; twigs somewhat flattened at the nodes, glabrous, grayish or greenish brown, often covered with a bloom; lateral buds nearly spherical or broadly ovate, terminal buds larger, conical, usually with a pair of lateral buds at the same level; bud scales brown, scurfy, those of the terminal buds loosely imbricated and frequently ending in sharp, more or less deciduous points; leaf scars crescent-shaped to nearly semicircular, notched at the apex; leaves odd-pinnate with

5–9 (usually 7) leaflets; lateral leaflets stalked, their petiolules 5–10 mm. long, ovate to ovate-lanceolate, rounded and often somewhat unequal at the base, occasionally somewhat narrowed, acute, or acuminate at the apex, 7–16 cm. long, 3.5–7 cm. wide, bright green and glabrous above, much lighter and glaucous beneath and minutely papillose, often with a few hairs along the veins, rather thick and firm in texture, their margin entire to crenate-denticulate; flowers dioecious, the staminate in rather loose panicles, calyx obsolete, stamens mostly 2, anthers about 6 mm. long, apiculate; the

FRAXINUS NIGRA FRAXINUS AMERICANA

(Leaves and fruits ×½)

pistillate in loose panicles with conspicuous bracts, calyx obscurely lobed, persistent in fruit; samara 2–5 cm. long, narrowly elliptical in outline, 4–7 mm. wide, the body terete and narrowly elliptical in outline, about 15 mm. long, the wing extending only a short distance down the sides. (*Americána,* American.)

Rare in the extreme southern edge of the state. Though previously reported throughout the state, it is known to the authors only from Hickory Island, Freeborn County. Occasionally planted. Distributed from Nova Scotia to Iowa and Nebraska and southward to Florida and Texas. Wood light brown, close-grained, hard, strong, and elastic, used in the manufacture of agricultural implements, for oars, handles of tools, furniture, and interior finish of buildings.

2. Fraxinus pennsylvanica Marsh. Arb. Am. 51. 1785.

RED ASH

A tree up to 20 m. in height and a trunk diameter of 1 m.; bark of trunk grayish brown, rather prominently ridged, but not quite as rough as that of the white ash; first-year twigs terete, pubescent, grayish brown; lateral buds broadly ovoid, somewhat compressed dorsally, dark brown and scurfy; terminal buds conical, the two outer scales generally overtopping the next pair of scales and only partially covering them, dark scurfy brown and more or less pubescent along the middle; leaf scars semicircular or broadly crescent-shaped, with the bundle-trace forming an arc above the middle of the scar; leaves odd-pinnate, with 5–9 leaflets and pubescent rachis; lateral leaflets more or less stalked, their petiolules 2–5 mm. long, lanceolate, ovate-lanceolate, or elliptical, somewhat rounded or narrowed at the base, long or sometimes short acuminate at the apex, 4–11 cm. long, 2–5 cm. wide, the terminal one generally slightly larger and concavely narrowed towards the base; upper surface dark green and glabrous, lower surface lighter green and pubescent, especially along the principal veins; margin entire or entire only towards the base and more or less crenate-serrate above; flowers dioecious, the staminate in short crowded panicles, stamens 2–4, apiculate, calyx obsolete; the pistillate in loose, open panicles, calyx turbinate or campanulate, more or less irregularly toothed or cleft, persistent in fruit; samara spatulate or narrowly rhombic, rounded, blunt or emarginate at the apex, 3–5 cm. long, 5–8 mm. wide, the body 12–18 mm. long, narrowly fusiform with the wings decurrent one-third to one-half of its length. (*Pennsylvánica*, Pennsylvanian.)

Mostly in low ground throughout the state, apparently much less common than the following variety. Maine, west to North Dakota, south to Florida and Texas.

A very variable species with several geographical races, or possibly a group of closely related species, differing in form of leaf, form of fruit, and amount of pubescence. Several of these forms have been given specific or varietal names. The following is fairly well marked in Minnesota.

Wood similar to white ash but coarser grained and more brittle.

2a. F. pennsylvanica var. **lanceolata** (Borkh.) Sarg. Silva, 6: 51. 1894.

GREEN ASH

Fraxinus lanceolata Borkh. 1809.
Fraxinus viridis Michx. f. 1813.

A tree very similar to the preceding; young twigs and petioles and rachises of leaves glabrous; lateral leaflets obscurely stalked, or rarely with petiolules 2–4 mm. long; leaflets thin, bright green on both sides, glabrous above, glabrous beneath except for more or less pubescence along the larger

veins; apex usually long acuminate, base narrowed, rarely rounded; margin usually coarsely sharp serrate to below the middle, less commonly obscurely serrate or nearly entire; flowers and fruit not distinguishable from typical *F. pennsylvanica*. (*Lanceoláta*, lanceolate, the most common form of the leaflets.)

Common in moist situations throughout the state, by far the most abundant ash in Minnesota. Frequently planted as an ornamental tree. Maine, west to Saskatchewan, southward to Florida, Texas, and Arizona.

FRAXINUS PENNSYLVANICA CHIONANTHUS VIRGINICA
(Leaves and fruits ×½)

3. Fraxinus nigra Marsh. Arb. Am. 51. 1758.

BLACK ASH

A medium-sized to large tree reaching a maximum height of 25 m. and a trunk diameter of 6–8 dm.; bark of trunk gray and irregularly scaly; lateral buds large nearly globular; terminal buds pyramidal, angular, bud scales black, somewhat scurfy; leaf scars prominent, semicircular to nearly circular, often deeper than wide, the bundle traces prominent, forming a nearly closed curve; twigs very stout, round, much enlarged at the nodes, glabrous, young twigs pale and glabrous; leaves odd-pinnate, leaflets 7–11, rachis glabrous

except for tufts of brownish yellow hairs at the base of the leaflets; leaflets sessile, oblong-lanceolate, 7.5–17 cm. long, 2.5–5 cm. wide, the terminal one generally smaller; base narrowed or sometimes slightly rounded, apex long acuminate; upper surface glabrous, lower surface somewhat pubescent along the veins or nearly glabrous, margin crenate or crenate-serrate; flowers polygamo-dioecious, in compact panicles, entirely naked; anthers elliptical, rounded at the apex; the pistillate flowers with rudimentary stamens; samara elliptical or oblong-elliptical, about 4 cm. long and 8 mm. wide, body flat, wing extending to the base, rounded or emarginate at the apex. (*Nigra*, black.)

Common in low and swampy ground, throughout the forested part of the state, most abundant in the eastern third. Newfoundland to Manitoba, south to Virginia and Arkansas.

Wood rather soft, coarse-grained, tough, easily separable into thin layers, used for baskets, hoops, splint boxes, and interior finish. The black burls are much sought for by veneer manufacturers. (See cut on p. 326.)

2. CHIONANTHUS L. Sp. Pl. 8. 1753.

Shrub or small tree, with simple, entire, opposite leaves; flowers in cymose panicles at the ends of leafy branches, perfect or polygamous; sepals 4, small, united; petals 4, linear, united only at the base; stamens 2, inserted on the corolla tube; ovary 2-celled; stigma notched; ovules 2 in each cell; fruit a drupe, usually 1-seeded. (*Chionánthus*, Gr. snowflower.)

A genus of about 3 species of southeastern North America and China. The following species is the only one cultivated in Minnesota.

1. Chionanthus virginica L. Sp. Pl. 8. 1753.

FRINGE TREE

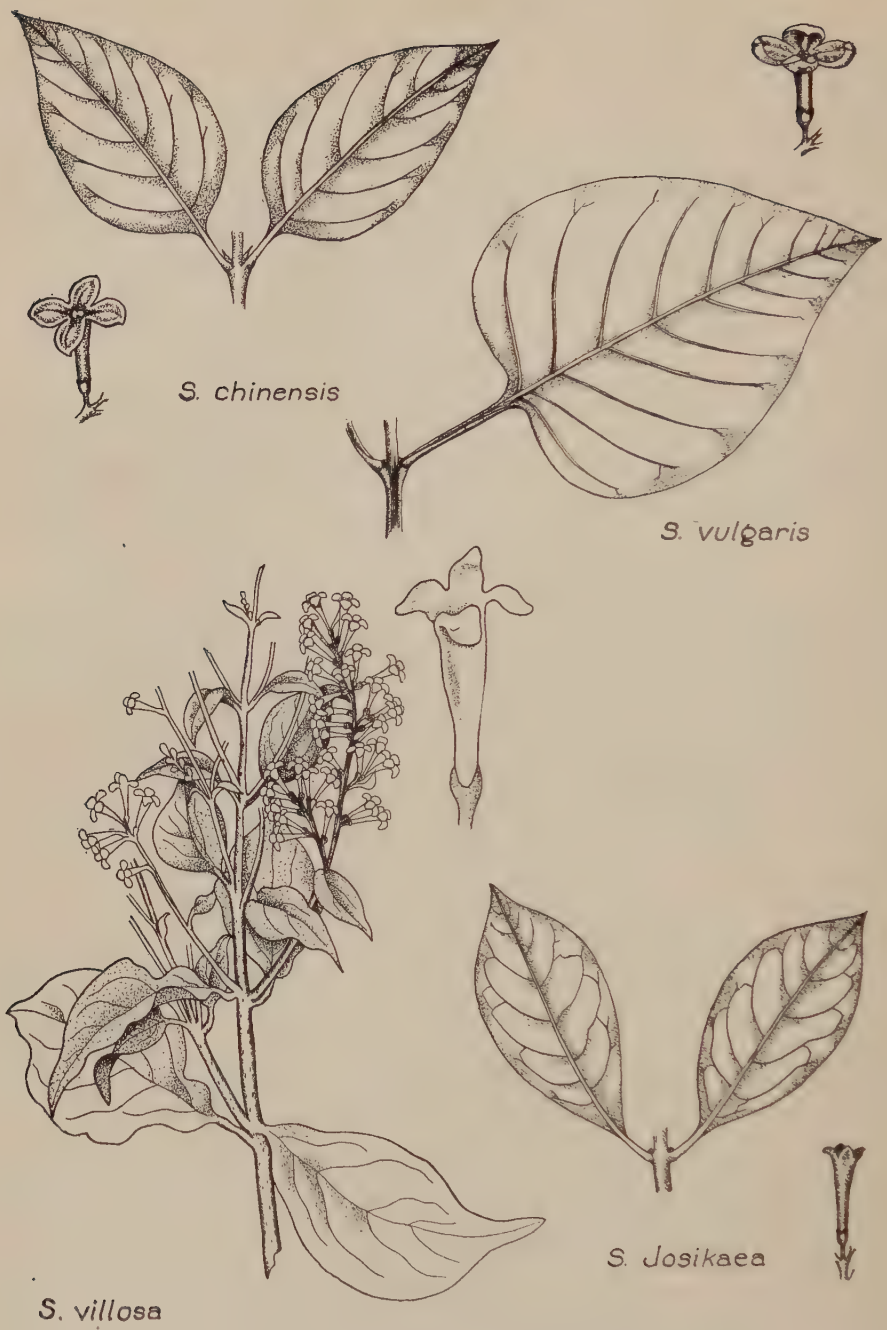
A large shrub or small tree 2–8 m. high; twigs grayish olive-green, puberulent or glabrate, with numerous prominent lenticels; leaves mostly elliptic-lanceolate, acute or short acuminate, rarely rounded at the apex, narrowed at the base, 8–17 cm. long, 4–8 cm. wide, dark green and glabrate above, lighter green beneath and more or less pubescent mostly along the veins, margin entire; petiole about 1 cm. long; flowers borne in loose, cymose panicles on the ends of twigs, which bear much reduced leaves; petals white, linear, 1.5–3 cm. long, 1–2 mm. wide; stamens strongly apiculate; drupe purple, with bloom, ovoid 1–1.8 cm. long, pulp thin covering the large stone. (*Virginiána*, Virginian.)

Occasionally cultivated and apparently hardy in the latitude of Minneapolis. Native of the southeastern United States from New Jersey to Missouri, south to Florida and Texas.

2. SYRINGA L. Sp. Pl. 9. 1753.

LILAC

Shrubs or small trees with opposite, entire, simple or rarely pinnate leaves; flowers in panicles, from terminal or lateral buds; sepals 4, united



SYRINGA

into a short tubular or campanulate calyx; petals 4, united into a tubular or funnel-shaped corolla with a spreading 4-lobed limb; stamens 2, inserted on the tube of the corolla; pistil of 2 united carpels; ovary 2-celled, with 2 ovules in each cell; style 1; stigma 2-lobed or nearly entire; fruit a loculicidal capsule with 4 narrowly winged seeds. (*Syringa*, from Gr. *Syrinx*, a pipe, applied anciently to *Philadelphus coronaria*, probably on account of its hollow internodes, first transferred to the lilac by Dodonaeus. The name is still popularly applied to *Philadelphus*.)

About 28 species natives of Europe and Asia. Several species are among our most valuable ornamental shrubs.

1. Tube of corolla much longer than the calyx; stamens included, nearly sessile.
   a. Mature shoots often without a true terminal bud; panicles on nearly naked shoots from the uppermost buds of the previous year's growth; flowers in May.
      (1) Leaves cordate or truncate at the base, 5–10 cm. long, panicles compact 1. *S. vulgaris*
      (2) Leaves narrowed at the base, smaller, panicles somewhat loose.
         (a) Leaves 2–4 cm. long, frequently pinnately lobed; panicles about 8 cm. long 2. *S. persica*
         (b) Leaves 5–7 cm. long, not lobed; panicles up to 15 cm. long 3. ×*S. chinensis*
   b. Shoots with a true terminal bud; panicles borne terminally on leafy shoots of the current year; flowers in June.
      (1) Leaves pubescent on the veins beneath, margins finely ciliate; capsules obtuse 4. *S. villosa*
      (2) Leaves glabrous beneath, margins not ciliate; capsules acute 5. *S. Josikaea*
2. Tube of corolla little longer than the calyx, stamens exserted.
   a. Shrub with panicles 8–14 cm. long; leaves mostly narrowed at the base, glabrous 6. *S. amurensis*
   b. Small tree with panicles up to 25 cm. long; leaves mostly truncate or rounded at the base, hairy beneath 6a. *S. amurensis* var. *japonica*

1. Syringa vulgaris L. Sp. Pl. 9. 1753.

COMMON LILAC

A large shrub, 2–5 m. high; twigs terete, stiff, olive green, the young growth glandular puberulent, soon becoming glabrous; buds ovate, somewhat pointed, the terminal bud normally abortive in mature twigs, the growth of the season ending in a pair of lateral buds; bud scales smooth; leaves ovate, 4–10 cm. long, 3–7 cm. wide, base rounded, apex acute, dull dark green above, somewhat paler beneath, glabrous, margin entire, truncate, or generally slightly cordate; petiole about 2–3 cm. long; panicles commonly in pairs from the pseudo-terminal buds, appearing with the leaves in early spring and blooming about the time that the leaves reach full growth; flowers very fragrant, typically reddish violet on the outside, paler and more bluish within; pedicels and calyx glandular puberulent; sepals about equal; corolla tube narrowly cylindrical, about 1 cm. long, lobes ovate, rounded, about 5 mm. long; fruit a flattened, somewhat woody capsule about 1–1.5 cm. long, 5 mm. wide, glabrous, acute. (*Vulgáris*, common.)

Native of eastern Europe. One of the most commonly planted of ornamental shrubs, and perfectly hardy throughout the state, often persisting indefinitely in

abandoned door-yards, cemeteries, etc. Blooming about May 15 in the southern half of the state, as late as July 1 in the extreme northeastern part.

There are many horticultural varieties of the common lilac, some with double flowers. Their color ranges from white through various shades of violet and purple to a deep reddish purple. The white forms have paler foliage and tend to form taller and less compact bushes.

2. Syringa persica L. Sp. Pl. 9. 1753.

PERSIAN LILAC

A shrub 1–2 m. high, with slender, somewhat arching branches; young growth sparsely glandular, puberulent or entirely glabrous; buds pointed, bud scales glabrous; twigs slender, more or less angular, gray or brownish gray, with well-marked lenticels; leaves simple or some of them often divided or pinnatifid, glabrous; simple leaves lanceolate 2–3 cm. long, about 1 cm. wide, entire, base narrowed, tip acute or somewhat acuminate; lobed and pinnatifid leaves somewhat larger, often irregular; panicles about 8 cm. long, from the uppermost lateral buds and often also from a true terminal bud, less compact than in *S. vulgaris*; flowers fragrant, pale lilac or white; sepals lanceolate; corolla tube narrowly cylindrical, about 1 cm. long, lobes ovate-lanceolate, somewhat acute; capsule quadrangular, somewhat winged, about 1 cm. long, 3 mm. wide, obtuse with a small mucro. (*Pérsica*, Persian.)

Probably native of Afghanistan and Cashmir. It has been long in cultivation in Persia whence it was introduced into Europe. The true Persian lilac is rather rarely planted in Minnesota. It is distinctly inferior to the hybrid *Syringa chinensis*, which has more or less usurped its common name.

3. ×Syringa chinensis Willd. Berl. Baumz. 378. 1796.

ROUEN LILAC

S. vulgaris×*persica*.
S. rothomagensis A. Rich. 1844.

A shrub 1–3 m. high with slender, somewhat arching branches, the young growth almost glabrous; buds pointed, the bud scales loosely imbricated, glabrous; twigs slender, more or less angular, bright green, becoming olive-brown, with well-marked lenticels; leaves simple, ovate-lanceolate, 5–7 cm. long, 3–4 cm. wide, dark green on both sides, glabrous, entire, tip acute or acuminate, base narrowed; panicles as in *S. persica* but larger, often 14 cm. long; flowers fragrant, reddish purple, darker than those of typical *S. vulgaris*, corolla tube about 0.8 cm. long, slender, the lobes longer and more pointed than in *S. vulgaris*; fruit not ripening in Minnesota (reported in southern Europe as very rarely bearing capsules similar to those of *S. persica*). (*Chinénsis*, Chinese, an obviously inapplicable name, but the earliest given to this form.)

A hybrid originally grown in Rouen, France in 1777. Much planted as an ornamental shrub in Minnesota, and often incorrectly called "Persian lilac." Though somewhat less vigorous in growth than the common lilac, it is a very satisfactory shrub, blooming while still quite small. It blooms about one week later than the common lilac, and in our region appears to be entirely sterile.

4. Syringa villosa Vahl, Enum. 1: 38. 1804.

A tall shrub up to 4 m. high, the young growth finely pubescent; buds broadly ovate, pointed, the terminal buds present, much larger than the lateral buds, bud

scales finely puberulent; twigs terete, dark gray, puberulent; leaves elliptic to elliptic-ovate, narrowed at the base, apex short acuminate, 4.5–20 cm. long, 2–11 cm. wide, dark green and glabrous above, paler and pubescent and sparsely villous along the veins, margin entire, ciliate; panicles borne on the ends of leafy shoots, 10–30 cm. long, more or less pubescent; flowers with unpleasant odor; calyx campanulate, 2 mm. long, glabrate, the lobes ciliated; corolla lilac or pale pink, tube narrow, about 11 mm. long, lobes subacute, spreading or somewhat reflexed; fruit obtuse or somewhat acute, straight or slightly curved, smooth or with a few lenticels 1–1.5 cm. long. (*Villósa*, hairy.)

Native of China and Korea. Occasionally cultivated, blooming in early summer.

5. Syringa Josikaea Jacq. Flora., 14: 67. 1831.

Erect shrub, up to 4 m. high; the young growth yellowish brown, puberulent; buds broadly ovate, the terminal present, much larger than the lateral ones, bud scales minutely puberulent; twigs terete, somewhat flattened at the nodes, brown or olivaceous, not conspicuously lenticillate; leaves broadly elliptical, base rounded or narrowed, apex short acuminate, 5–12 cm. long, 3–5 cm. wide, glabrous, dark green above, pale and glaucous beneath, entire, margin sparsely ciliolate; panicles borne at the ends of leafy shoots, 10–20 cm. long, axis puberulent; flowers with a faint but pleasant odor; calyx campanulate, glabrous, 2 mm. long, slightly 4-toothed or truncate; corolla deep lilac, tube funnel-shaped, 1–1.5 cm. long, lobes ovate, subacute, about 2 mm. long, somewhat ascending; capsules cylindrical, acute, smooth, about 1 cm. long, 4 mm. in diameter. (*Josikaéa*, named for Rosalia L. B. Josika.)

Native of Hungary and the Erz Mountains, occasionally cultivated. There are several garden forms varying in the color of the flowers. There are also cultivated hybrids of this with the previous species.

6. Syringa amurensis Rupr. Bull. Phys. Math. Acad. Petersb. 15: 371.1857.

Spreading or upright shrub 2–3 m. high, the young growth nearly or quite glabrous; buds obtusely pointed or nearly spherical, the terminal bud abortive; bud scales glabrous, finely and irregularly wrinkled; twigs terete with enlarged nodes, the leaf scars projecting prominently beyond the base of the axillary buds; twigs grayish or greenish brown with prominent round lenticels, the bark soon scaling off and leaving the branches dark brown and cherry-like; leaves broadly ovate to lance-elliptic; base narrowed or rarely somewhat rounded, apex long acuminate, 4–10 cm. long, margin entire, surface glabrous, the lower surface distinctly reticulately veined; petiole 1–2 cm. long; panicles usually in pairs from the pseudo-terminal buds of the previous season, 8–14 cm. long; flowers, somewhat fragrant, cream-white; calyx campanulate, about 1 mm. long, nearly truncate, or irregularly and shallowly toothed; corolla rotate, about 8 mm. in diameter, tube very short; stamens long exserted; capsule about 1.5 cm. long, 4 mm. in diameter, acute, the surface roughened with numerous lenticels, fruiting calyx very short. (*Amuréns*is, relating to the Amur River.)

Native of Manchuria, Korea, and the Amur region. Planted but little in Minnesota, but a desirable shrub blooming in mid-June. The following variety is more frequently planted.

6a. S. amurensis var. **japonica** (Maxim.) Franch. & Sav. En. Pl. Jap. 2: 435. 1879.

JAPANESE TREE LILAC

S. japonica (Maxim.) Decne. 1879.

A small tree 5–10 m. high; leaves more broadly ovate, usually rounded or truncate at the base, 4–12 cm. long, 2.5–8 cm. wide, margin ciliolate, lower surface more or less hirsute; panicles larger, up to 25 cm. long, flowers larger, often over 1 cm. in diameter. (*Japónica*, Japanese.)

A native of Japan, frequently planted in Minnesota. There is considerable question whether this plant should be regarded as a well-marked geographical variety of *S. amurensis* or as a distinct species.

4. FORSYTHIA Vahl, Enum. 1: 39. 1804.

FORSYTHIA

Shrubs 2–3 m. high with opposite, more or less serrate, simple or trifoliolate leaves and showy yellow flowers appearing in early spring before the leaves, each flower from a scaly winter bud, which may be solitary or clustered (2–5) in the axil of a leaf of the previous season; sepals 4, united below; corolla campanulate; petals united for about one-third of their length, their tips spreading; stamens 2, borne on the base of the corolla; carpels 2, united; ovary 2-celled, with numerous ovules; style 1; stigma 2-lobed; fruit a woody septicidal capsule containing numerous winged seeds. (*Forsýthia*, named for William Forsyth, English horticulturist.)

A genus of four species natives of China, Japan, and southeastern Europe. The forsythias are very ornamental garden shrubs much planted in the eastern and central states. In Minnesota they are entirely hardy but unsatisfactory since the flower buds almost always winter-kill except when they are buried in snow. The following species are occasionally planted in the vicinity of Minneapolis and a few flowers are usually to be found in early spring on the lowest branches.

1. Twigs brown, internodes of branches hollow; flowers bright yellow with orange-yellow stripes in the throat of the corolla 1. *F. suspensa*
2. Twigs greenish, usually with lamellate pith; flowers greenish yellow 2. *F. viridissima*

1. Forsythia suspensa Vahl, Enum. 1: 39. 1804.

Shrub about 2.5 m. high; twigs brown with hollow internodes; leaves sharply serrate, some of them usually ternately compound, the simple leaves rounded or broadly cuneate at the base; calyx about as long as the corolla tube, corolla bright yellow with deeper orange stripes in the throat, about 2.5 cm. long. (*Suspénsa*, hanging, referring to the drooping branches.)

Native of China. Two varieties are planted: *F. suspensa* var. *Sieboldii* Zabel, with weak, pendulous branches, and few compound leaves, and *F. suspensa* var. *Fortunei* Rehder with erect, arching branches, and abundant compound leaves.

2. Forsythia viridissima Lindl. Journ. Hort. Soc. 1: 226. 1846.

Erect shrub about 3 m. high; twigs olive-green, internodes with lamellate pith; leaves simple, oblong-lanceolate or lanceolate, tapering at the base, entire or somewhat serrate above the middle; calyx shorter than the corolla tube; corolla bright greenish yellow, 1.5–2.5 cm. long. (*Viridissima*, very green, referring to the branches.)

Native of China.

SOLANACEAE NIGHTSHADE FAMILY

Herbs, shrubs, vines, and trees, with alternate, mostly simple, or pinnately compound leaves, and perfect, regular, or sometimes somewhat irregular, solitary or cymose flowers; sepals 5, united; petals 5, united, mostly folded in the bud; stamens 5, inserted on the tube of the corolla, all fertile or rarely 4 fertile and 1 staminode; carpels 2, united; ovary superior, 2-celled or rarely through secondary partitions 5–8-celled; style 1; stigma 2-lobed; fruit a berry or a capsule.

A family of about 70 genera and 1,700 species, in temperate and tropical regions. Most of the species occurring in temperate regions are herbaceous. The following is our only shrubby genus.

1. LYCIUM L. Sp. Pl. 191. 1753.

BOX THORN

Shrubs or woody vines, mostly poisonous, with small, alternate, entire leaves, commonly with smaller ones fascicled in their axils; twigs often thorny; flowers mostly solitary in the axils of the leaves; calyx campanulate, 3–5-lobed or toothed, not enlarged in fruit, persistent at the base of the berry; corolla funnel-form, salver-form or campanulate, usually 5-lobed, tube very short or longer than the lobes; anther sacs longitudinally dehiscent; fruit a berry, usually scarlet. (*Lýcium*, named for the country Lycia.)

1. Corolla tube longer than the lobes, much narrower below the middle; leaves usually lanceolate ..... 1. *L. halimifolium*
2. Corolla tube shorter than the lobes, rather wide; leaves rhombic-ovate to ovate-lanceolate ..... 2. *L. chinense*

1. Lycium halimifolium Mill. Gard. Dict. ed. 8. no. 6. 1768.

MATRIMONY-VINE

L. vulgare Dunal, 1852.

A spreading shrub 1–3 m. high; branches at first upright but later arching or recurving, more or less spiny, light gray and frequently somewhat angled; leaves quite variable, lanceolate, elliptic-lanceolate, or oblanceolate, gradually narrowed towards the base, mostly acute at the apex, 2–7 cm. long, 0.3–2.5 cm. wide, grayish green, slightly papillose roughened on both sides; petiole variable in length, 2 mm.–2 cm. long; flowers mostly solitary in the axils of the leaves; calyx 2–3-lobed; corolla dull purple, about

1.5 cm. in diameter, the tube longer than the lobes, much constricted below; stamens exserted, filaments expanded and hairy at the base; fruit oblong, 1.5–2 cm. long, scarlet to orange red. (*Halimifólium*, having leaves like sea purslane.)

Occasionally planted and hardy. Native of southeastern Europe and western Asia.

2. Lycium chinense Mill. Gard. Dict. ed. 8. no. 5. 1768.

CHINESE MATRIMONY-VINE

A low, rambling shrub with arching and often prostrate branches, up to 3 m. long, slightly thorny or unarmed, yellowish gray, somewhat angled; leaves variable, rhombic-ovate to ovate-lanceolate, acute or obtuse at the apex, broadly to narrowly wedge-shaped at the base, 3–11 cm. long, 1.5–6 cm. wide, bright green and remaining green until late in the autumn, glabrous; petiole not over 1.5 cm. long; flowers solitary or in clusters of 2–3 in the axils of the leaves; calyx irregularly 2–5-lobed; corolla dull purple-violet, about 1 cm. in diameter, the tube shorter than the lobes, not much constricted, lobes mostly with ciliate margins; stamens long exserted, hairy above the base; fruit ovoid, 1–2.5 cm. long, scarlet or orange red. (*Chinénse*, Chinese.)

Planted chiefly as drapery over walls and sometimes grown on trellises but not truly a vine. Native of north China and Manchuria.

LYCIUM HALIMIFOLIUM

BIGNONIACEAE BIGNONIA FAMILY

Trees, shrubs, and woody vines (rarely herbs), with opposite or whorled (rarely alternate), simple or pinnately compound leaves without stipules; flowers showy, in clusters, hypogynous, more or less zygomorphic; calyx of 5 united sepals, often 2-lipped; corolla of 5 united petals campanulate, funnel-shaped, or tubular, more or less irregular, somewhat 2-lipped; fertile stamens 4 or 2, borne on the throat of the corolla and alternating with the lateral petals; anthers 2-celled, longitudinally dehiscent; pistil compound, consisting of 2 united carpels; ovary superior, 2-celled (rarely 1-celled) with

numerous ovules, placentation parietal or upon the partition wall of the ovary; style one, filiform; stigma with two leaf-like lobes; fruit a 2-valved capsule; seeds flat, mostly winged, without endosperm.

A family of about 60 genera and 500 species, mostly tropical.

1. CATALPA Scop. Introd. 170. 1771.

CATALPA

Trees (or shrubs) with large, simple, opposite or whorled, petioled leaves and showy flowers in terminal corymbs or cymose panicles; calyx closed in the bud, splitting irregularly into 2 lips; corolla tube campanulate, oblique, two-lipped; petals unequal, the upper ones smallest; stamens borne near the base of the corolla, fertile stamens 2 (rarely 4), the anther sacs widely divergent; staminodes 3 (rarely 1); disk nearly obsolete; ovary 2-celled; fruit an elongated linear-cylindrical capsule, with loculicidal and septifragal dehiscence; seeds very numerous, flat, strongly winged at the sides and narrowly all around; cotyledons deeply 2-lobed. (*Catálpa*, the Indian name for the southern catalpa tree.)

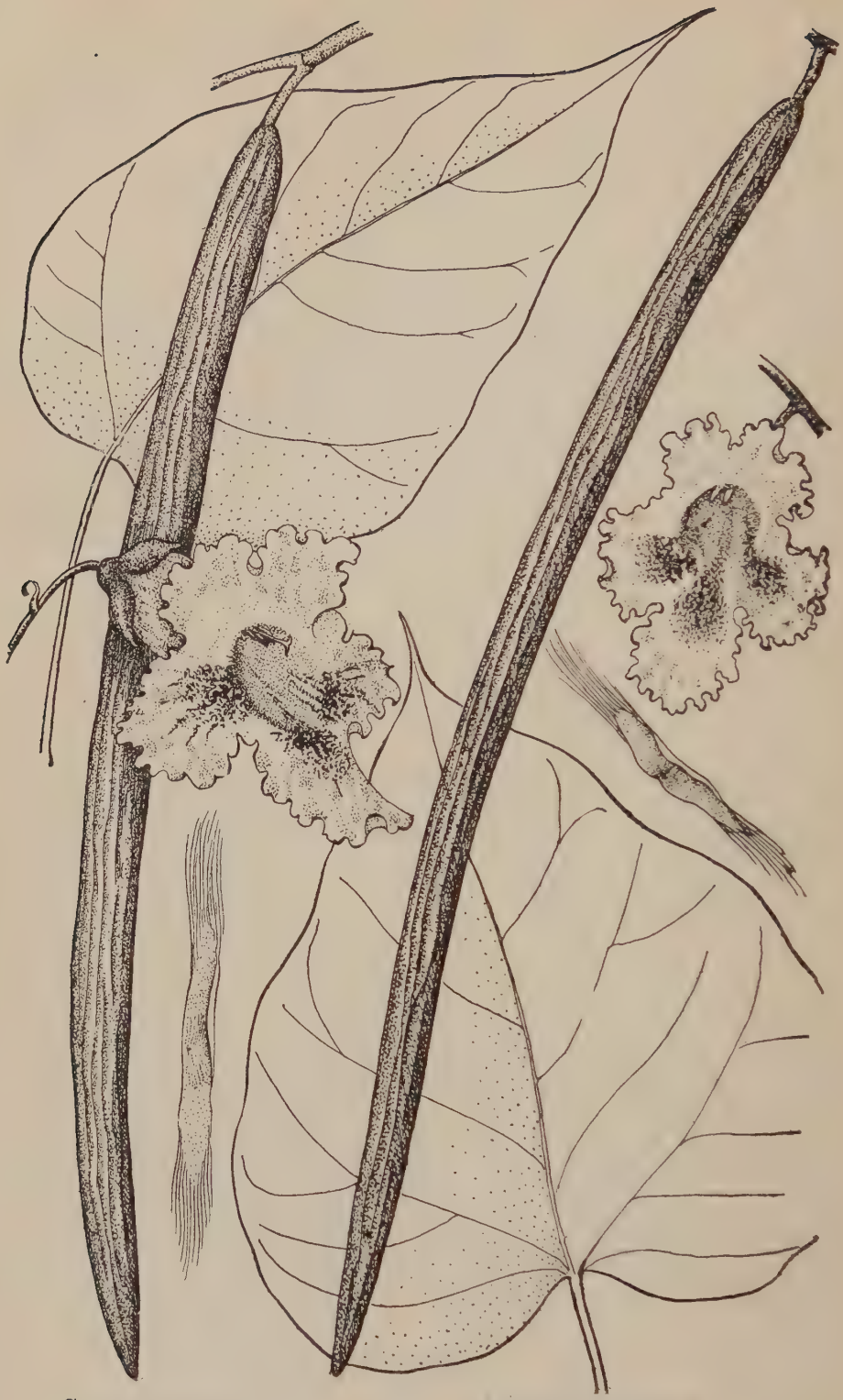
A genus of about 10 species, natives of the eastern United States, the West Indies, and eastern Asia.

1. Capsules 1–2 cm. in diameter; seeds about 2.5 cm. long (exclusive of the hairs); flowers 5 cm. or more in diameter, white with purple markings.
   a. Leaves acute or broadly acuminate; flowers up to 7 cm. in diameter, sparsely spotted 1. *C. speciosa*
   b. Leaves narrowly and abruptly acuminate; flowers 5 cm. in diameter, thickly spotted with purple 2. *C. bignonioides*
2. Capsules 0.5–0.8 cm. in diameter; seeds about 1.5 cm. long (exclusive of the hairs); flowers less than 5 cm. in diameter, yellow with orange and purple markings 3. *C. ovata*

1. Catalpa speciosa Warder, ex Engelm. Bot. Gaz. 5: 1. 1880.

HARDY CATALPA

A medium-sized to large tree, in Minnesota 12–20 m. high and about 3 dm. in diameter but in its native range attaining a height of 40 m. and a trunk diameter of 6–14 dm.; bark grayish brown with longitudinal scaly ridges; buds very small, scarcely protruding, bud scales very loosely imbricated, sparingly ciliate; twigs greenish brown, glabrous, with marked lenticels and very prominent elliptical leaf scars; leaves opposite or in whorls of 3, broadly ovate, mostly 3-nerved, rounded or cordate at the base, acute or gradually acuminate at the apex, margin entire, 16–30 cm. long, 10–16 cm. wider bright green above and nearly glabrous except along the larger veins, slightly paler below and pubescent especially along the veins; petiole about as long as the leaf blade; flowers in flat-topped, cymose panicles; corolla up to 7 cm. in diameter, white, inconspicuously purple-spotted inside; petals more or less ruffled along the margin, the lower one distinctly notched; capsule 25–40 cm. long, about 1.2–1.8 cm. in diameter; body of seed 25–30 mm. long, 7–9 mm. wide, with tufts of rather coarse hairs, about 1 cm. long. (*Speciósa*, beautiful.)



CATALPA SPECIOSA

CATALPA BIGNONIOIDES

Frequently cultivated in the southern half of the state, not reliably hardy north of the Twin Cities. Native of bottom lands, southern Indiana to Missouri, south to Tennessee and Arkansas. Wood light brown, soft, coarse-grained, very durable in contact with the soil.

2. Catalpa bignonioides Walt. Fl. Car. 64. 1788.

CATALPA, INDIAN BEAN

C. Catalpa (L.) Karst.

Differs from *C. speciosa* in the narrowly acuminate leaves, which are frequently indistinctly 3–5-lobed, and have an unpleasant odor when crushed, and in the larger panicles of flowers, which are heavily dotted with purple and have two yellow stripes inside. (*Bignoniotdes*, bignonia-like.)

Occasionally planted, but appears not to be hardy as far north as Minnesota. Native of the Gulf states and as far north as Tennessee.

3. Catalpa ovata Don, Syst. 4: 1837.

A small to medium-sized tree, in Minnesota rarely over 6 m. high; leaves broadly ovate, frequently somewhat 3–5-lobed, mostly 5-nerved, 15–30 cm. long, 15–25 cm. wide, mostly cordate at the base, abruptly acuminate at the apex, finely pubescent with simple hairs, or at length becoming nearly glabrate; petiole 4–14 cm. long; panicle pyramidal, 10–25 cm. long; corolla 2–3 cm. in diameter, pale yellow, with orange stripes and purple dots on the inside; capsule 30–35 cm. long, 6–8 mm. in diameter; seeds, exclusive of the hairs 12–15 mm. long, 3–4 mm. wide, with tufts of very fine hairs 1 cm. long at the ends. (*Ováta*, ovate, referring to the shape of the leaves.)

A native of China, rarely cultivated in Minnesota, where it seems to be reasonably hardy, but does not reach large size.

RUBIACEAE MADDER FAMILY

Herbs, shrubs, or trees; leaves simple, opposite, or verticillate, mostly with stipules; flowers perfect but often dimorphous, regular; calyx tube adherent to the ovary, its limb variously lobed; corolla sympetalous, campanulate, funnel-shaped or rotate, 4–5-lobed, frequently hairy within; stamens 4–5, borne on the corolla and alternate with its lobes; ovary 1–10-celled, inferior; ovules 1–several in each cavity of the ovary; style short or elongated; fruit a capsule, a berry, or a drupe.

A very large family of about 340 genera and 4,500 species, the greater number of which are found in tropical regions. Only one genus of woody plants of this family occurs within the state.

1. CEPHALANTHUS L. Sp. Pl. 95. 1753.

BUTTONBUSH

Shrubs or small trees, leaves opposite or verticillate, short-petioled and entire; flowers in axillary or terminal heads, small, white or yellow, subtended by bracts; calyx tube short, its limb 4-lobed; corolla tubular, with 4 slightly spreading lobes; stamens 4, inserted on the corolla tube, with very

short filaments; ovary 2-celled, 1–2 ovules in each cavity; style slender, long-exserted, stigma capitate; fruit splitting into 2–4 achene-like parts. (*Cephalánthus*, Gr. head flower, referring to the dense inflorescence.)

A genus of 6 species, natives of North America and Asia. The following is the only one occurring in the United States.

CEPHALANTHUS OCCIDENTALIS

1. Cephalanthus occidentalis L. Sp. Pl. 95. 1753.

BUTTONBUSH

A shrub, 1–3 m. high; branches glabrous; leaves opposite or verticillate, entire, petioled, ovate or oblong-lanceolate, mostly narrowed at the base, acuminate at the apex, glabrous above, glabrous or very sparingly pubescent beneath, 7–14 cm. long, 4–6 cm. wide; petiole 1–2 cm. long; peduncles axillary and terminal, 6–10 cm. long; heads globose, 2–4 cm. in diameter; flowers white, sessile and closely crowded, 8–12 mm. long; styles slender, about twice as long as the corolla; calyx tube surmounting the ovary, persistent; fruit narrowly obconic, 5–6 mm. long. (*Occidentális*, western, i.e., native of the New World.)

In swamps and low ground, infrequent in the southeastern part of the state as far north as Taylor's Falls. Distributed from New Brunswick to western Ontario and California, south to Florida, Texas, and Arizona. Blossoms in June, fruit ripe in September.

CAPRIFOLIACEAE HONEYSUCKLE FAMILY

Shrubs, trees, woody vines, or perennial herbs; leaves opposite, simple or pinnately compound; flowers perfect, regular or irregular, cymose; calyx tube adherent to the ovary, 2–5-toothed or lobed at the top, or the sepals obsolete; petals united into a sympetalous tubular, campanulate, or rotate corolla, 5-lobed above, frequently with a sac-like enlargement at the base; stamens 5 (rarely 4), borne on the tube of the corolla and alternating with the lobes, anthers oblong, or narrow and elongated, filaments inserted on the corolla; ovary inferior, 2–5-celled, style slender, stigma enlarged or capitate, 2–5-lobed; ovules 1–several in each cell; fruit a 1–several-seeded berry, drupe or capsule; seeds oblong or globose, with small embryo, and fleshy endosperm.

A family of about 10 genera and 300 species, mostly north temperate.

1. Leaves compound; flowers small, white, in compound cymes 1. *Sambucus*
2. Leaves simple.
   a. Flowers in compound cymes; corolla rotate, small; fruit a 1-seeded drupe 2. *Viburnum*
   b. Flowers in pairs, or few-flowered racemes or cymes; corolla campanulate or tubular; fruit a berry or a capsule.
      (1) Fruit a few-seeded berry, margin of leaves entire (sometimes lobed).
         (a) Corolla short campanulate or short funnel-form, regular 3. *Symphoricarpus*
         (b) Corolla tubular or long campanulate, more or less irregular 4. *Lonicera*
      (2) Fruit a 2-celled capsule, leaves serrate 5. *Diervilla*

1. SAMBUCUS L. Sp. Pl. 269. 1753.

ELDER

Shrubs, trees, or perennial herbs; leaves opposite, pinnately compound; leaflets serrate, or sometimes lacinately cut or dissected; flowers small, white, very numerous in compound cymes; calyx lobes or teeth 3–5, minute or almost lacking, corolla 3–5-lobed, regular, rotate; stamens 5, attached to the base of the corolla, filaments short; ovary 3–5-celled, one ovule in each cavity; style short, 3–5-lobed; fruit a berry-like drupe, containing 3–5 1-seeded stones. (*Sambúcus*, the classical name of the elderberry.)

A genus of about 20 species, of wide geographical distribution, most abundant in north temperate regions. Besides the following, 3 other species occur in the western part of North America.

1. Pith brown; inflorescence pyramidal, appearing in early spring; fruit red, inedible 1. *S. pubens*
2. Pith white; inflorescence flat-topped, in midsummer; fruit nearly black, edible.

a. Stems scarcely woody, bark not warty, leaflets mostly 7; stones of fruit mostly 4 2. *S. canadensis*

b. Stems woody, bark warty, leaflets mostly 5; stones of fruit 3 3. *S. nigra*

1. Sambucus pubens Michx. Fl. Bor. Am. 1: 181. 1803.

RED-BERRIED ELDER

A woody shrub 1–4 m. high; bark gray and warty; young shoots commonly pubescent, with large brown pith, foliage unpleasantly strong-smelling when bruised; leaflets 5–7, sessile or short-stalked, ovate to ovate-lanceolate, 4–13 cm. long, 2–4 cm. wide, occasionally much larger, base narrowed, rounded or subcordate, mostly unequal, apex acute or acuminate, margin sharply serrate, the teeth rather spreading, upper surface dark green, puberulent along the main veins, otherwise nearly glabrate, lower surface much paler, mostly densely hirsute, rarely nearly glabrous; petiole 2.5–5 cm. long, mostly hirsute, stipules 3–5 mm. long, ovate or ligulate; inflorescence a pyramidal cymose panicle, 4–7 cm. long, 3–5 cm. wide, becoming somewhat diffuse in fruit; flowers yellowish white, 3–4 mm. broad; petals reflexed; stamens very short, the anthers about 0.8 mm. long; stigmas nearly sessile, projecting but little above the level of the corolla; fruit bright red, 4–5 mm. in diameter, acid; nutlets dark yellow-brown, finely transversely rugose, 2–2.5 mm. long. (*Púbens*, pubescent.)

On rocky banks, in ravines, woods, etc., frequently in waste ground, common throughout the state. Newfoundland to Manitoba, south to Pennsylvania, Ohio, South Dakota, and in the mountains to Georgia. Reports from the Rocky Mountains and the Pacific Coast seem to be due to confusion between this and other related western species. Flowers in April and May, fruit ripe in June and July.

This species is one of a group of closely related species of the northern cool temperate regions, typified by the Old World *S. racemosa* L., with which they have frequently been confused. *S. racemosa* has somewhat smaller and generally glabrous leaves, with finer appressed serration, smaller and more compact inflorescences, notably larger anthers, and a peculiar turgid stylopodium, which raises the stigmas considerably above the level of the corolla. *S. racemosa* var. *laciniata* Koch, a cut-leaf form of the European red-berried elder is occasionally cultivated in Minnesota. A corresponding cut-leaf form of the native elder (*S. pubens* var. *dissecta* Brit.) has been reported from the Lake Superior region. Its occurrence in Minnesota is doubtful.

2. Sambucus canadensis L. Sp. Pl. 269. 1753.

COMMON ELDER, AMERICAN ELDER

A shrub 1–3 m. high; stems scarcely woody, with nearly smooth, grayish brown bark and large white pith; leaflets 5–11, mostly 7, ovate to ovate-oblong or lanceolate, 7–15 cm. long, 3–6 cm. wide, the lower leaflets often showing a tendency to become ternately compound, base of leaflets narrowed, rounded or subcordate, apex long acuminate, margin sharply serrate, upper surface lustrous, bright green, glabrous except for puberulence along

the midrib sometimes extending out along the larger veins, lower surface paler, more or less hirsute along the midrib and larger veins and puberulent along the smaller veins or sometimes nearly glabrous, upper leaflets nearly

SAMBUCUS PUBENS (above) SAMBUCUS CANADENSIS (below) (×⅓)

or quite sessile, lower leaflets with practically glabrous petiolules up to 1.5 cm. long, stipels frequently present; petiole 4–5 cm. long, puberulent along the upper side, stipules mostly wanting; inflorescence a very ample flat cyme, 10–20 cm. broad; flowers white, 5–6 mm. broad; sepals triangular, nearly as long as the inferior portion of the ovary, petals but slightly reflexed, stamens somewhat exceeding the petals, filaments slender, anthers oblong, about 0.5 mm. long, upper part of ovary protruding above the level of the corolla, forming a conical stylopodium, which bears at its summit the completely united stigmas; fruit purplish black, 5–6 mm. in diameter, edible; stones usually 4, flattened, about 3.5 mm. long, rugose-papillose. (*Canadénsis*, Canadian.)

In moist or rich soil, chiefly in bottom lands, common throughout the south half of the state, rare north of the Twin Cities and apparently absent from the northeastern part of the state. Nova Scotia to Manitoba, south to Florida and Texas. Blossoms in late June and July, fruit ripe in August and September.

S. canadensis var. *laciniata* Gray., the American cut-leaf elder, has the leaflets dissected and compounded. It is occasionally planted.

3. Sambucus nigra L. Sp. Pl. 269. 1753.

EUROPEAN ELDER

A shrub closely resembling *S. canadensis* but taller and more woody, bark with corky warts; leaflets usually 5, the petiolules hirsute, stipels wanting; sepals much shorter than the inferior portion of the ovary, stamens not exceeding the petals, the filaments rather broad; stigmas 3, distinct at the top of a conical stylopodium; fruit black, about 7 mm. in diameter, stones usually 3. (*Nigra*, black, referring to the fruit.)

Seldom seen in Minnesota in the typical form, but horticultural varieties with yellow and with variegated leaves are sometimes planted, also *S. nigra* var. *laciniata* L., a form with the leaflets deeply dissected and compounded.

2. VIBURNUM L. Sp. Pl. 267. 1753.

ARROW-WOOD

Shrubs or trees; leaves entire, serrate, dentate, or lobed, stipules sometimes present, leaf buds naked or with a pair of scales; flowers white, or rarely pink, numerous, in flat compound cymes, sometimes the marginal flowers of the cyme larger and sterile, calyx ovoid or turbinate, 5-toothed; corolla rotate or spreading, regular, 5-lobed; stamens 5, borne on the tube of the corolla, ovary inferior, 1–3-celled, ovule 1 in each cavity of the ovary; style short, 3-lobed or 3-cleft; fruit a 1-celled, 1-seeded, ovoid or globose drupe; stone somewhat flattened and ridged, seed compressed. (*Vibúrnum*, the classical name of the wayfaring tree.)

A genus of about 100 species, of wide geographical distribution. In addition to the following, about 15 other species occur in different parts of North America.

1. Leaves 3-lobed, palmately veined.
   a. Flowers all perfect and alike; lobes of leaves shallow, not coarsely dentate 1. *V. pauciflorum*
   b. Some or all of the flowers sterile; leaves more deeply 3-lobed, coarsely and irregularly dentate.
      (1) Marginal flowers large and sterile, central ones perfect, clusters flat-topped.
         (a) Lobes of leaves mostly long acuminate, longer than broad, petiolar glands small (native) 2. *V. trilobum*
         (b) Lobes of leaves obtuse to short acuminate, broader than long, petiolar glands 1 mm. in diameter (cultivated) 3. *V. Opulus*
      (2) All the flowers large and sterile, clusters spherical (cultivated) 3a. *V. Opulus* var. *roseum*
2. Leaves not lobed, pinnately veined, dentate or serrate.
   a. Leaves finely serrate or serrate-dentate (25 or more teeth on each side of leaf); terminal winter buds elongated.
      (1) Leaves and inflorescence densely pubescent, winter buds naked (cultivated) 4. *V. Lantana*
      (2) Leaves and inflorescence glabrous, winter buds scaly 5. *V. Lentago*
   b. Leaves coarsely dentate (mostly less than 10 teeth on each side of leaf), terminal winter buds short.
      (1) Lower surface of leaves glabrous except along the veins and in their axils; upper petioles 8–12 mm. long 6. *V. affine*
      (2) Lower surface of leaves densely soft pubescent; upper petioles not over 7 mm. long 6a. *V. affine* var. *hypomalacum*

1. Viburnum pauciflorum Raf. Alsog. Am. 58. 1838.

SQUASHBERRY

A low, straggling shrub 0.7–2 m. high, bark grayish, young shoots reddish brown and ridged; leaves broadly oval or obovate, narrowed, truncate or cordate at the base, mostly with three shallow lobes, dentate, glabrous above, more or less pubescent on the veins beneath, 5–9 cm. long, 4.5–9.5 cm. wide, petioles 1–2 cm. long; cymes few-flowered, about 2 cm. broad, terminating short 2-leaved lateral branchlets; flowers all perfect, 5–6 mm. broad, stamens shorter than the corolla; drupe globose to ovoid, light red, acid, 8–10 mm. long, stone ovate, pointed. (*Pauciflórum*, few-flowered.)

In cold woods north of Lake Superior. Distributed from Newfoundland to Alaska, south to Maine, Vermont, Pennsylvania, Minnesota, and in the Rocky Mountains to Colorado. Blossoms in June, fruit ripe in August and September.

V. acerifolium L. differs from this species in having the leaves soft pubescent beneath, and the cymes larger (4–6 cm. in diameter) and terminating the principal branches. It has been reported from southeastern Minnesota, but its presence there seems very doubtful. It occurs in central Wisconsin.

VIBURNUM PAUCIFLORUM VIBURNUM TRILOBUM

VIBURNUM LENTAGO (below)

2. Viburnum trilobum Marsh. Arb. Am. 162. 1785.

HIGH-BUSH CRANBERRY, PEMBINA

V. americanum of authors, not Miller.
V. opulus var. *americanum* Ait. Hort. Kew. 1789.

A shrub 1–3 m. high, branches nearly erect, smooth and grayish brown, twigs glabrous; leaves deeply 3-lobed, 5–13 cm. long, 4.5–12 cm. broad, cuneate or rounded at the base, the lobes strongly divergent, acuminate to caudate acuminate, coarsely and irregularly dentate or sometimes almost entire; upper surface dark yellow-green, sparsely strigose; lower surface somewhat paler, with a fringe of stiff pubescence along the larger veins, and scattered appressed hairs on the smaller veins, sometimes nearly glabrous; margin ciliate; petiole about 2.5 cm. long, bearing near the upper end two (rarely several) small stalked glands about 0.4 mm. in diameter; stipules filiform, 3–8 mm. long; inflorescence a flat-topped cyme, 5–10 cm. in diameter; the outer flowers neutral, 1–2 cm. broad, corolla white, nearly wheel-shaped, deeply 5-lobed, somewhat irregular; fertile flowers much smaller, 2–3 mm. broad, calyx (best seen just after the corolla falls) forming a collar-like ring about the summit of the ovary, the individual sepals very short, truncate, often scarcely distinguishable; drupe bright red, ellipsoid, up to 12 mm. long, sour and bitter but edible when cooked, stone elliptical, rarely broadly ovate, 1–1.5 mm. thick, convex on the dorsal side, concave on the ventral. (*Trilobum*, three-lobed, referring to the leaves.)

In swamps and low ground, common throughout the northern half of the state and in the Big Woods, less frequent southward to Houston County. Distributed from Newfoundland and Quebec to Manitoba, south to New Jersey, Pennsylvania, Illinois, and South Dakota. Flowers in May and early June, fruit ripe in September.

This species seems sufficiently distinct from the European *V. Opulus* of which it is usually regarded as a variety. Besides the differences in the shape and pubescence of the leaves there are marked differences in the calyx and in the stone of the drupe. Specimens from the Pacific Coast appear to belong to *V. Opulus*, rather than to *V. trilobum*.

The fruit is used for making sauce and preserves. "Pembina borne first by a river, and then given to the town and county is stated by Keating to be from the Chippewa word for this fruit, *anepeminan*, which name has been shortened and corrupted into Pembina." Upham, W., *Flora of Minnesota*.

3. Viburnum Opulus L. Sp. Pl. 268. 1753.

A shrub 2–3 m. high, with smooth grayish branches; twigs glabrous; leaves 3-lobed, 3.5–10 cm. long, 4–11 cm. wide, rounded to cordate at the base, the lobes short acuminate, acute, or somewhat obtuse, coarsely and irregularly dentate or rarely the lateral lobes nearly entire; upper surface dark green, glabrous except for a little puberulence along the main veins and sometimes a few strigose hairs close to the margin; lower surface paler, mostly soft pubescent; margin ciliate; petiole about 1.5 cm. long, bearing 2–several large glands about 1 mm. in diameter; stipules linear, frequently over 1 cm.

long; inflorescence nearly flat, 5–10 cm. in diameter; the outer flowers neutral, 1–3 cm. broad, corolla white, nearly wheel-shaped, deeply 5-lobed; fertile flowers much smaller, 3–5 mm. in diameter, calyx minute, consisting of 5 distinct triangular teeth; corolla broad campanulate, the petals reflexed, stamens exserted; drupe round-oval, red, up to 12 mm. long, stone nearly orbicular, flat, less than 1 mm. thick. (*Opulus*, classical Latin name for a tree.)

Native of Eurasia, and also probably of Pacific North America. The typical form is occasionally planted, but much more commonly the following variety.

3a. V. Opulus L. var. roseum L. Sp. Pl. 268. 1753.

SNOW-BALL, GUELDER ROSE

V. Opulus var. *sterilis* DC. 1830.

A form with almost spherical cymes, the flowers all large and neutral. (*Róseum*, rose-like.)

Extensively planted as an ornamental shrub and perfectly hardy. The leaves are likely to be badly infested with aphis, causing them to curl and shrivel very badly. Blossoms in June.

4. Viburnum Lantana L. Sp. Pl. ed. 2. 384. 1762.

WAYFARING TREE

A shrub or sometimes a small tree, 1–3 m. high; branches brown, young shoots ashy pubescent, winter buds naked; leaves ovate to ovate-oblong, mostly cordate at the base, blunt or acutish at the apex, finely and sharply serrate or serrate-dentate, densely stellate pubescent on both sides; petiole 1–2 cm. long, pubescent; cymes short-peduncled, the whole cluster about 6–8 cm. broad; flowers all perfect and alike, 7–10 mm. broad, stamens 6–7 mm. long; fruit oblong-ovoid, flattened, about 1 cm. long. (*Lantána*, a genus name of mythological origin.)

Frequently cultivated and perfectly hardy. Introduced from Eurasia. Blossoms in May, fruit ripe in August.

5. Viburnum Lentago L. Sp. Pl. 268. 1753.

BLACK HAW, NANNYBERRY

A tall shrub or sometimes a small tree, 3–6 m. high; bark smooth and gray or brownish; winter buds scaly, acuminate; young shoots glabrous; leaves oval or ovate, rounded at the base, acuminate at the apex, very finely and sharply serrate, glabrous on both sides or sometimes slightly puberulent beneath, 4–11 cm. long, 2.5–5.5 cm. wide; petiole about 2 cm. long, often widened and wavy-margined below the middle; inflorescence consisting of 4–6 sessile cymes, the cluster hemispherical, 6–10 cm. broad; flowers white, 6–7 mm. broad, stamens about 3 mm. long; drupe oval, bluish black, 10–12 mm. long, slightly flattened, edible, stone oval, flat. (*Lentágo*, Latin name of a shrub.)

In rich woods, frequently along banks of streams, common throughout the south half of the state, less frequent northward. Distributed from Quebec to Manitoba, south to New Jersey, Georgia, Indiana, and Missouri. Blossoms in May and June, fruit ripe in August.

6. Viburnum affine Bush, ex Blake, Rhodora, 20: 14. 1918.

A branching shrub 6–14 dm. high, bark dark gray, twigs yellow-brown, glabrous, leaves ovate or oblong-ovate, 4–8 cm. long, 2–7 cm. wide, apex acute to acuminate, base mostly cordate, rarely rounded or narrowed, margin coarsely and often sharply dentate with 6–11 teeth on each side, ciliate; upper surface dark green, glabrous; lower surface somewhat paler yellow-green, more or less pubescent along the principal veins and in their axils, otherwise glabrous; stipules linear, persistent, about 6 mm. long; petioles

VIBURNUM LANTANA VIBURNUM AFFINE

(×⅔)

5–12 mm. long, those of the uppermost pair of leaves on sterile twigs, mostly over 10 mm.; cymes peduncled, 7-rayed, the rays about 1 cm. long, minutely glandular, the whole cyme 2–5 cm. broad; flowers 4 mm. broad, stamens about 3 mm. long; drupe oval, dark purple, about 8 mm. long; stone flattened, plano-convex with two marked grooves on the dorsal surface, and two obscure submarginal grooves on the ventral surface. (*Affine*, related to, signifying its close relationship to *V. dentatum*.)

Fairly common throughout the southern part of the state as far north as the Twin Cities, rare farther north, not occurring within the region of coniferous forests where it is replaced by the following variety. Ontario to Minnesota, south to Illinois and Missouri, also in Virginia. Flowers in May and early June, fruit ripe in August.

6a. V. affine var. **hypomalacum** Blake, Rhodora, 20: 14. 1918.

V. pubescens of authors, not Ait.

Leaves somewhat smaller, 3–7 cm. long, 1.5–5 cm. wide, more frequently rounded at the base, upper surface often appressed pubescent, lower surface densely soft pubescent, petioles rarely exceeding 7 mm.; fruit about 6 mm. long. (*Hypomálacum*, Gr., soft beneath.)

Abundant throughout the region of coniferous forests, rare farther south, as far as the Minnesota Valley. Vermont to Manitoba, south to Maryland, Michigan, Minnesota, and in the mountains to Georgia.

An intermediate form with pubescent leaves, petioles about 1 cm. long, and fruit 7 mm. long has been collected in Chisago County.

3. SYMPHORICARPOS Juss. Genera, 211. 1789.

SNOWBERRY, WOLFBERRY

Low, upright, branching shrubs; leaves opposite and simple; flowers pink or white, small, perfect, in axillary or terminal clusters; calyx tube short, 5-toothed, regular; corolla campanulate or tubular, 4–5-lobed, sometimes hairy on the inside, occasionally gibbous at the base; stamens 4–5, borne on the corolla tube; ovary inferior, 4-celled, 2 of the cells containing abortive ovules, the others with a single ovule in each; style slender, stigma capitate or 2-lobed; fruit a 2-seeded berry, seeds bony.

A genus of about 10 species, natives of North America, except one from China. (*Symphoricárpos*, Gr., clustered fruit.)

1. Flowers sessile in dense axillary and terminal spikes; stamens and styles exserted
   1. *S. occidentalis*
2. Flowers short-pedicelled, solitary or in an interrupted terminal (rarely also axillary) raceme; stamens and styles enclosed in the corolla.
   a. Leaves pubescent beneath.
      (1) Leaves pale green beneath — 2. *S. albus*
      (2) Leaves whitened beneath — 2a. *S. albus* var. *pauciflorus*
   b. Leaves glabrous beneath — 2b. *S. albus* var. *laevigatus*

1. Symphoricarpos occidentalis Hook. Fl. Bor. Am. 1: 285. 1833.

WOLFBERRY

A low, erect shrub 3–10 dm. high, more or less freely branching, spreading freely by the root and often forming dense colonies; young twigs puberulent, light reddish brown, slender, but mostly over 1 mm. in diameter, bark of older stems gray and shredded; leaves rather thick, ovate, entire or more or less deeply round-lobed, especially on young shoots, 3–11 cm. long, 1.5–7 cm. wide; base rounded or narrowed; apex acute to rounded, mucronate; upper surface dark dull green, sparingly strigose pubescent, or more frequently glabrate except along the midrib and close to the margin, lower sur-

face paler bluish green, thinly pubescent at least along the veins; margin somewhat revolute; petiole 4–10 mm. long, pubescent; flowers in short dense terminal and axillary spikes, the peduncles usually very short or nearly wanting, rarely 1–3 cm. long; flowers sessile, the bracts and bractlets broadly ovate, ciliate; calyx mostly regularly 5-toothed, the sepals ciliate; corolla pinkish, heavily bearded within, short funnel-form, 6–9 mm. long, the petals somewhat longer than the tube; stamens somewhat exserted, anthers over 2 mm. long; style exserted, the exposed portion glabrous, the middle portion varying from entirely glabrous to densely bearded; berry dull white, soon becoming discolored and blackish; seeds plano-convex, 4–5 mm. long, straw-colored, smooth. (*Occidentālis*, western.)

Dry soil, common in the prairie and hardwood districts, not occurring northeastward. Michigan to British Columbia, north on the plains to lat. 64°, south to Illinois, Kansas, and Colorado. Blossoms in June and July, fruit ripe in September, often persistent throughout the winter.

This is one of the few species of woody plants that grow freely on the open prairies. The leaves are very variable in form and size. Particularly on young shoots from the root, they are often very large and deeply lobed. Whenever the old growth has been destroyed, flowers and fruit are apt to be formed on these first-year shoots. The style of this species has usually been described as glabrous. In two-thirds of the Minnesota specimens examined, its middle portion is strongly bearded, and in half of the remainder it bears a few hairs. About the same proportion holds for specimens from other parts of the range. No other characters appear to correlate in the least with this style character.

2. Symphoricarpos albus (L.) Blake, Rhodora, 16: 118. 1914.

SNOWBERRY

Vaccinium album L. 1753.
S. racemosus Michx. 1803.

A low shrub 2–6 dm. high or occasionally taller; young twigs glabrous, or more frequently puberulent, light yellow-brown, exceedingly slender, bark of older stems gray becoming blackish with age; leaves thin, ovate, elliptic-oblong, or nearly orbicular, 2–5 cm. long, 1–3 cm. wide, base narrowed or rounded, apex acutely or obtusely pointed or rounded, occasionally apiculate but not mucronate; upper surface bright green, glabrous or with a few appressed hairs; lower surface in the typical form paler but not whitened, pilose at least along the veins; margin entire, ciliate; petiole 2–5 mm. long, rarely longer; flowers short-pedicelled, solitary in the upper axils or sometimes also in a terminal interrupted spike-like raceme, the bracts lanceolate, bractlets deltoid, scarcely at all ciliate; calyx irregularly 5-toothed, the sepals glabrous or more or less ciliate; corolla pink and white, heavily bearded within, campanulate, somewhat gibbous at the base, 4–5 mm. long, the petals shorter than the tube; stamens not exserted, anthers 1–1.5 mm. long; style

much shorter than the corolla, glabrous; berry bright white, about 6 mm. in diameter, seeds plano-convex, straw-colored, minutely rough. (*lÁbus*, white, referring to the color of the berries.)

In rocky and dry soil throughout the wooded parts of the state, most abundant northwards, and along the bluffs of the Mississippi. Gaspé and Hudson Bay region to Alaska, south to Massachusetts, Pennsylvania, Michigan, Minnesota, Montana, Washington, and (?) California.* Blossoms in June, fruit ripe in August.

SYMPHORICARPOS OCCIDENTALIS SYMPHORICARPOS ALBUS

2a. S. albus var. **pauciflorus** (Robbins) Blake, Rhodora, 16: 119. 1914.

A dwarf shrub, differing from the species in having the lower surface of the leaves more strongly pubescent and conspicuously whitened. (*Pauciflórus*, few-flowered, the original specimens being without racemes. They are quite as common, however, in this variety as in typical *S. albus*.)

Common in the region of evergreen forests, particularly in the north central part of the state, infrequent southward. Lake Superior and Lake Winnipeg to British Columbia, south to Minnesota, North Dakota, Colorado, and Oregon.

Forms intermediate between this variety and the typical species are rather common in Minnesota.

2b. S. albus var. **laevigatus** (Fernald) Blake, Rhodora, 16: 119. 1914.

Often taller, up to 2 m. high, leaves larger, glabrous, those on young shoots often more or less lobed, flowers usually in racemes. (*Laevigátus*, smooth.)

Frequently planted in Minnesota, and occasionally escaping. Native from the Gulf of St. Lawrence south in the mountains to Virginia, also in British Columbia and Washington. The cultivated form came originally from the West.

* The California plants seen by the authors appear to belong to a distinct variety.

4. LONICERA L. Sp. Pl. 173. 1753.

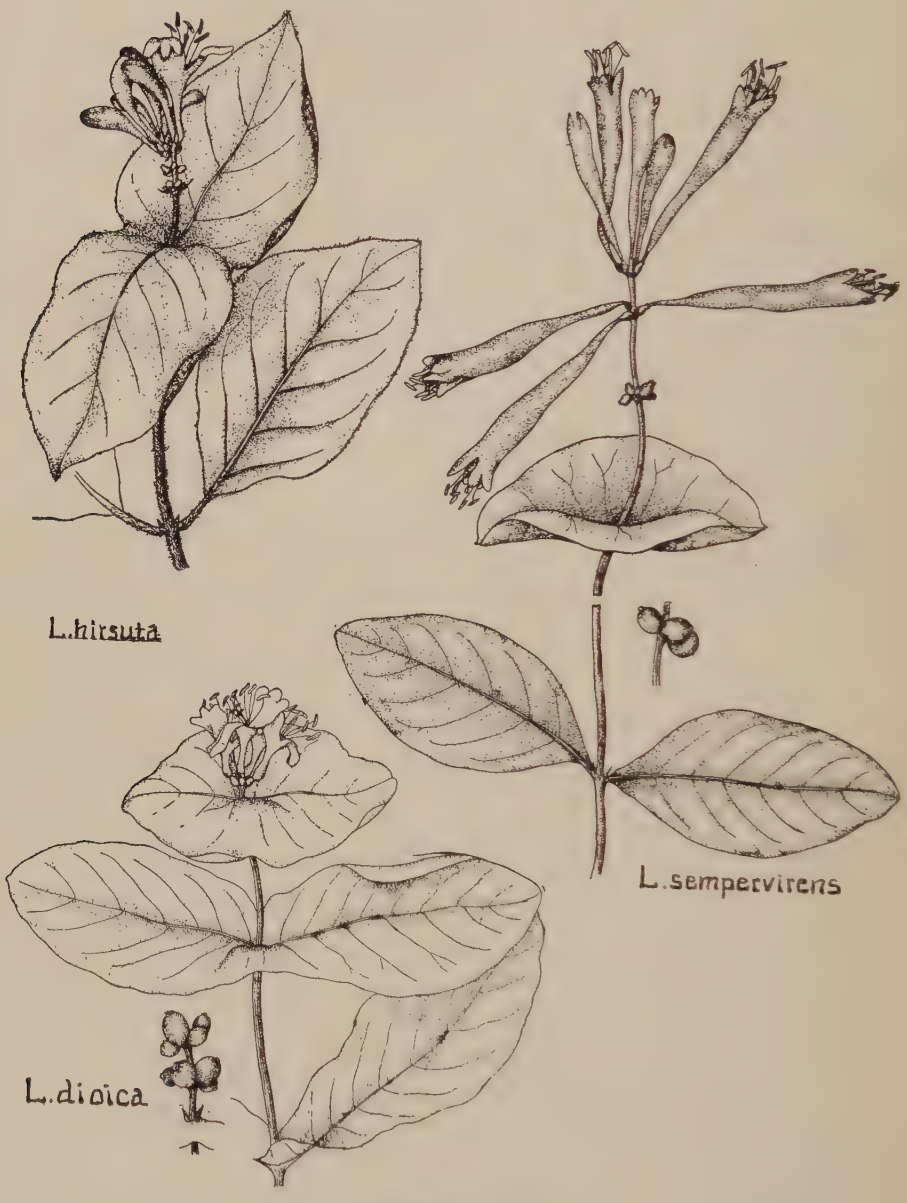
HONEYSUCKLE

Erect shrubs or woody, twining vines; leaves opposite, entire; flowers in terminal heads or spikes, or in pairs on axillary peduncles; calyx adherent to the ovary, its limb usually minute, 5-toothed or nearly entire, petals 5, united into a more or less irregular corolla; corolla trumpet-, funnel-, or bell-shaped, the tube often gibbous at the base and honey-bearing, the limb 5-cleft, or 2-lipped, the upper lip consisting of 4 petals, the lower of 1 petal; stamens 5, borne on the corolla tube, alternate with the petals; pistil 1, compound, 2–3-parted, ovary inferior, 2–3-celled (rarely 1-celled); style 1, stigma 1, capitate or 2–3-lobed; fruit a berry, usually 2–3-celled, few-seeded; in species with flowers in pairs, the two berries sometimes coalescent. (*Lonicéra*, named for Adam Lonitzer.)

A genus of about 100 species, chiefly of the north temperate zone.

1. Flowers terminal, in dense clusters or interrupted spikes; upper leaves of flowering shoots connate-perfoliate, usually vines; subgenus *Caprifolium*.
   a. Flowers long trumpet-shaped, anthers little exserted (cultivated) 1. *L. sempervirens*
   b. Flowers with a short corolla tube and spreading 2-lipped limb; anthers much exserted (native).
      (1) Margin of leaves parchment-like, not ciliate.
         (a) Uppermost perfoliate disk rhombic, not glaucous above; anthers about 2.5 mm. long.
            x. Leaves nearly or quite glabrous; outside of corolla not villous 2. *L. dioica*
            y. Leaves pubescent beneath; outside of corolla villous 2a. *L. dioica* var. *glaucescens*
         (b) Perfoliate disk nearly orbicular, glaucous on both sides; anthers about 4 mm. long 3. *L. prolifera*
      (2) Margin of leaves green, ciliate 4. *L. hirsuta*
2. Flowers in pairs, on axillary peduncles; none of the leaves connate-perfoliate; mostly upright shrubs; subgenus *Xylosteum*.
   a. Peduncles slender, over 1 cm. long.
      (1) Leaves narrowed towards the base; flowers strongly 2-lipped 5. *L. oblongifolia*
      (2) Leaves mostly rounded, truncate or cordate at base; petals nearly equal.
         (a) Flowers yellowish, funnel-shaped, petals much shorter than the tube; mature leaves yellow-green, ciliate 6. *L. canadensis*
         (b) Freshly opened flowers pink or white, the petals spreading, nearly equalling the tube; mature leaves blue-green, not ciliate.
            x. Twigs glabrous; flowers not becoming yellow with age 7. *L. tatarica*
            y. Twigs pubescent; flowers becoming yellow with age 9. ×*L. bella*
   b. Peduncles less than 1 cm. long.
      (1) Flowers white, becoming yellow with age, petals spreading; ovaries distinct 8. *L. Morrowi*

(2) Flowers yellowish from the first, narrowly campanulate; ovaries completely united 10. *L. caerulea* var. *villosa*



LONICERA. (×⅗)

1. Lonicera sempervirens L. Sp. Pl. 173. 1753.

TRUMPET HONEYSUCKLE

Twining vine 3 m. or more tall; bark pale brown, shredded; twigs glabrous; leaves elliptic or oblong 4–8 cm. long, 2–5 cm. wide on flowering shoots, often much larger on sterile shoots, the lower short-petioled, the uppermost pair on flowering shoots connate-perfoliate, forming a broad elliptical or rarely rhombic disk; apex of leaves rounded, minutely mucronulate; base rounded or somewhat narrowed; margin cartilagenous; upper surface dark green, glabrous; lower surface pale, glaucous, finely appressed puberulent; inflorescence a peduncled, interrupted spike often with secondary inflorescences in the axils of the connate-perfoliate leaves; ovary glabrous; limb of calyx minute, 5-lobed; corolla scarlet, often with more or less yellow especially within, trumpet-shaped, nearly regular, its tube 4–5 cm. long, about 6 mm. wide at the throat, its limb scarcely spreading, about 5 mm. long; stamens and style barely exserted; berries scarlet. (*Sempérvirens*, evergreen, a character that it possesses in the southern states, but not in Minnesota.)

Frequently cultivated as an ornamental vine, blooming in June and at intervals until severe frost in October. Native from Maine to Nebraska and southwards.

2. Lonicera dioica L. Syst. Nat. Veg. ed. 12. 2: 165. 1767.

L. glauca Hill, 1769.

L. parviflora Lam. 1783.

Twining vine 1–3 m. high, or frequently a straggling shrub about 1 m. high; bark grayish, peeling on old stems; twigs glabrous and glaucous; leaves oblong, elliptical, or obovate, 4–8 cm. long, 1.5–3.5 cm. wide on flowering shoots, the lower cordate-clasping, the upper 2–4 pairs connate-perfoliate, the uppermost pair forming a rhombic or elliptic-oblong disk usually strongly angled at the ends; apex of leaves rounded or obtuse, often mucronulate, upper surface bright green, glabrous, lower surface pale and glaucous, entirely glabrous or with a few scattered hairs, margin cartilaginous and without hairs; inflorescence a dense, head-like spike, sessile or short-peduncled; ovary glabrous, calyx limb barely 1 mm. long, obscurely 5-lobed, corolla yellowish or more frequently dull maroon with a yellowish tube, glabrous without, villous within, its tube 7–10 mm. long, gibbous at the base and expanding to a width of about 3 mm. at the throat, its limb 2-lipped, cleft into 5 somewhat unequal linear petals 5–10 mm. long; stamens strongly exserted, the thin filaments hairy; berries red. (*Dioíca*, dioecious, which this plant is not.)

Rare in eastern and southern Minnesota (see note after the following variety). Maine to Manitoba, south to North Carolina, Ohio, and Missouri.

2a. L. dioica var. **glaucescens** (Rydberg) Butters, Minn. T. and S. 289. 1912.

L. glaucescens Rydb. 1897.

Leaves ovate to obovate, often only one pair connate-perfoliate, the lower ones narrowed at the base and sometimes short-petioled, glabrous on the

upper surface and margin but with the lower surface more or less pubescent, often densely so; flowers more frequently pale yellow; tube of corolla hirsute on the outside, 10–20 mm. long, somewhat more slender than in the type; ovary sometimes gland-dotted. (*Glaucéscens*, becoming glaucous.)

Rocky woods, copses, bluffs, etc., throughout the wooded part of the state, much more abundant than typical *L. dioica*. Western New York and Ontario to Saskatchewan, south to Virginia, Nebraska, and Wyoming.

This form has been described as a distinct species but in Minnesota it intergrades completely with *L. dioica*. The latter is usually described as completely glabrous, but only two of the Minnesota specimens of the species in the University herbarium show this character. Several others, agreeing in all other respects with typical *L. dioica*, have a few scattered hairs on the lower side of the leaf, and it seems best to modify the conception of the species so as to include these forms. The form and number of perfoliate disks varies greatly even on the same plant, and appears to be a very unreliable character. Out of 20 flowering specimens showing the foliage characters attributed to the variety, five have the floral characters of typical *L. dioica*. Red-flowered specimens of the variety are not uncommon. Specimens with gland-dotted ovaries occur but appear to be rare in Minnesota.

3. Lonicera prolifera (Kirchner) Rehder, Rhodora, 12: 166. 1910.

Caprifolium prolifera Kirchner, 1864.
L. Sulivantii Gray, 1883.

Twining vine 3 m. or more tall; bark pale brown and glossy, peeling only on the older stems; twigs glabrous; leaves mostly broadly obovate, 3–7 cm. long, 2–4 cm. wide on flowering shoots, the lower narrowed to a short petiole, the upper 1–3 pairs connate-perfoliate, the uppermost pair forming a nearly orbicular (rarely slightly rhombic) disk, its ends retuse or sometimes mucronate; apex of leaves rounded or obtuse, usually mucronate; upper surface bright green with more or less glaucous bloom, glabrous; lower surface pale, very glaucous, appressed puberulent except in the case of the perfoliate disks, which are usually glabrous; margin cartilaginous and without hairs; inflorescence a sessile or short-peduncled spike about 1 cm. long, usually with small secondary inflorescences in the axils of the disk leaves; ovary glabrous; calyx limb about 0.5 mm. long, obscurely 5-lobed; corolla pale yellow, glabrous without, pubescent within, its tube 10–15 mm. long, very slender and scarcely gibbous below, expanding to about 3 mm. at the throat, its limb 2-lipped, cleft into 5 somewhat unequal linear petals about 8 mm. long; stamens strongly exserted, anthers 3–4 mm. long, filaments and style slightly hairy or nearly glabrous; berry red. (*Prolífera*, proliferous, probably referring to the inflorescence.)

Common in southeastern Minnesota, north as far as Red Wing, and west as far as Rochester. Ohio to Minnesota, south to Tennessee and Iowa.

4. Lonicera hirsuta Eaton, Man. Bot. ed. 2. 307. 1818.

Twining vine about 3 m. tall; bark grayish brown, soon peeling and exposing the pale brown inner bark; twigs hirsute; leaves broadly elliptical to orbicular, 5–11 cm. long, 3.5–8 cm. wide on the flowering shoots, the lower short-petioled, the upper 1–2 pairs connate-perfoliate, the uppermost forming a rhombic (rarely nearly orbicular) disk with mostly acuminate ends; apex of leaves very variable, mostly acute or short acuminate, base narrowed or rounded, upper surface dark green, finely appressed pubescent, lower surface pale, downy pubescent, margin ciliate, not at all cartilaginous; inflorescence a more or less peduncled spike about 1 cm. long, often with sessile or stalked secondary inflorescences in the axils of the disk leaves, peduncles hirsute and glandular; ovary glabrous; calyx limb scarcely 1 mm. long, obscurely 5-lobed; corolla pale yellow, pubescent and glandular without, pubescent within, its tube 10–18 mm. long, slender and somewhat gibbous below, expanding gradually into the 2-lipped, 5-petaled limb of about the same length; stamens strongly exserted, the anthers about 3 mm. long, filaments and style somewhat hairy below; berry red. (*Hirsúta*, hairy.)

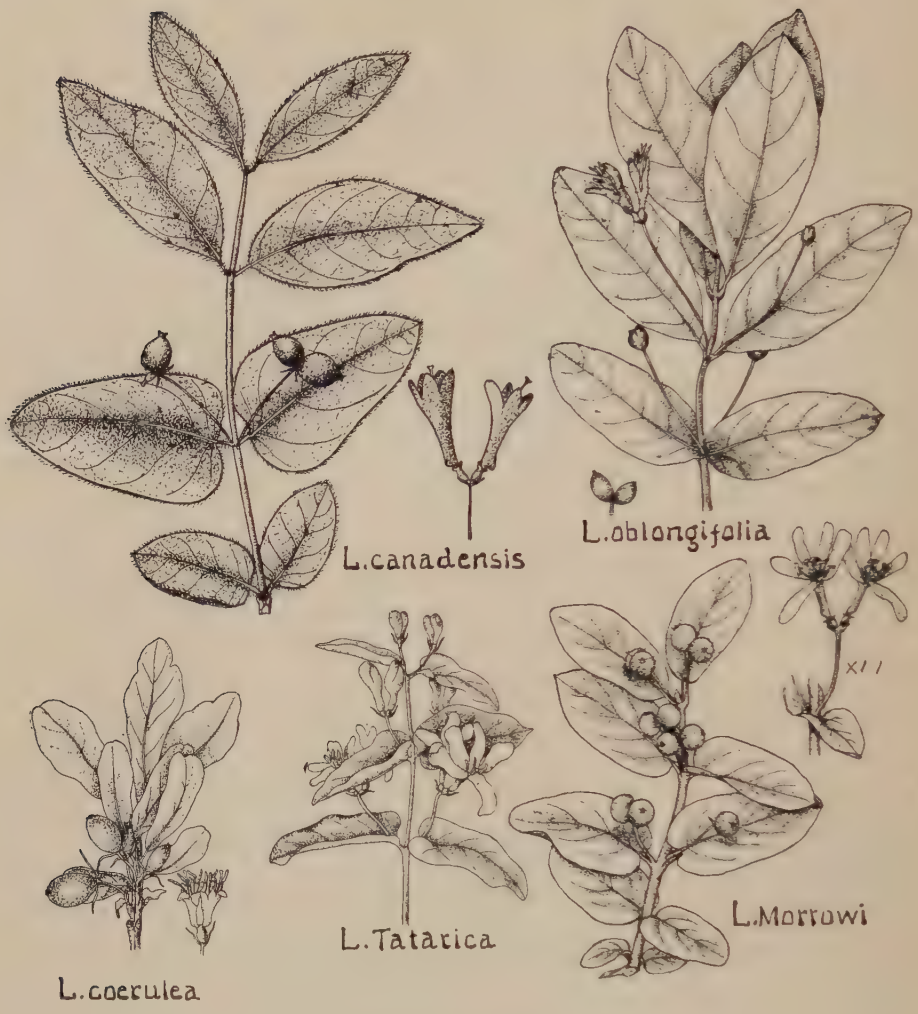
In Minnesota, common in the region of coniferous forests, not occurring elsewhere. Vermont to Manitoba, south to Pennsylvania, Michigan, and Minnesota.

5. Lonicera oblongifolia (Goldie) Hook. Fl. Bor. Am. 1: 284. 1833.

Xylosteum oblongifolium Goldie. 1822.

Shrub 5–15 dm. high, bark grayish, twigs puberulent; leaves ovate-lanceolate to oblong, thick, dark green above, pale beneath, finely woolly pubescent, especially beneath, margin thickened, woolly but not ciliate, apex acute or obtuse, base tapering, length 2.5–10 cm., width 1–3.5 cm.; petiole 2 mm. long or wanting; flowers in pairs in the axils of the lower leaves, peduncles slender, 1–3 cm. long, bracts at base of ovaries very minute, or deciduous before the flowers open; ovaries more or less fused; limb of the calyx nearly wanting, having 5 minute, triangular teeth less than 0.5 mm. long; corolla yellow, often streaked with purple, the tube about 5 mm. long, gibbous just above the base, more or less hairy within and without, limb 2-lipped, spreading, about 1 cm. across, the upper lip slightly 4-cleft, the lower consisting of a single petal; stamens exserted, the filaments hairy; fruit red or purplish, the two berries nearly distinct or more or less completely united. (*Oblongifólia*, oblong-leaved.)

Swamps in the region of coniferous forests in the northern and northeastern parts of the state. New Brunswick to Manitoba, south to northern New England, Pennsylvania, Michigan, and Minnesota. Flowers in June, fruit ripe in late July.



LONICERA (×3/5)

6. Lonicera canadensis Marsh. Arb. Am. 81. 1785.

L. ciliata Muhl. 1813.

Irregular shrub, 1–1.5 m. high; bark grayish, twigs glabrous; leaves ovate or lance-ovate, thin, bright green; upper surface glabrous, lower surface slightly hairy, margin ciliate, apex acute or somewhat obtuse, base acute, rounded, or cordate, length 2–9 cm., width 1.5–4 cm.; petiole 5–8 mm. long; flowers in pairs, in the axils of the lower leaves, peduncles slender, about 1 cm. long, bracts at base of ovaries small, the longest lanceolate, about

2 mm. long, the others about 0.5 mm. long, ovaries separate; limb of calyx obscurely lobed, about 1 mm. long; corolla greenish yellow, funnel-shaped, the tube gibbous at the base, 1.5 cm. long, expanding gradually into a nearly equally 5-lobed limb about 5 mm. long, slightly hairy within; stamens included; berries separate, red. (*Canadénsis*, Canadian.)

Moist woods in the region of coniferous forests in the northern and northeastern parts of the state. Nova Scotia to Saskatchewan, south to Pennsylvania, Michigan, and Maine. Flowers in May, fruit ripe in July.

7. Lonicera tatarica L. Sp. Pl. 173. 1753.

TARTARIAN HONEYSUCKLE, TWIN HONEYSUCKLE

Upright shrub 1.5–3 m. high; bark light gray, twigs glabrous, green or reddish; leaves ovate, glabrous, or somewhat pubescent beneath, rather thin, upper side dark green, lower paler but not glaucous, margin smooth or with a very few sparse hairs, apex acute or sometimes obtuse, base cordate, length 3–7 cm., width 1.7–4 cm.; petiole about 5 mm. long; flowers in pairs from the axils of the upper leaves, peduncles slender, 1–2 cm. long, bracts at the base of ovaries partly awl-shaped, about 5 mm. long, partly ovate, less than 1 mm. long; ovaries distinct, glabrous; limb of calyx with 5 lanceolate sepals, about 1 mm. long, corolla pink or whitish, the tube gibbous at the base, about 5 mm. long, hairy within, the limb irregularly cleft into 5 linear or lanceolate lobes, about 1 cm. long; stamens somewhat exserted, filaments hairy; berries slightly united at base, red. (*Tatárica*, Tartarian, referring to its native land.)

Cultivated, and tending to become established at least in the vicinity of the Twin Cities. Native of southeastern Russia and central Asia.

A hardy shrub much planted, ornamental both in flower and in fruit. Besides the typical form with light pink flowers, there are forms with white flowers and with various shades of pink and crimson flowers.

8. Lonicera Morrowi A. Gray, Rep. Perry Exped. Jap. 2: 313. 1856.

Spreading shrub about 2 m. high; bark grayish brown, twigs finely pubescent; leaves oblong, thick and veiny, dark green above, paler beneath, upper surface finely and sparsely hairy, lower surface hairy, margin ciliate, apex obtuse or rounded, base cordate, length 2.5–5 cm., width 1.5–2.5 cm.; petiole about 3 mm. long; flowers in pairs, axillary, peduncles 7–10 mm. long, bracts small, pubescent and ciliate, the two longest linear, 3–5 mm. long, the others ovate, about 2 mm. long; ovaries separate; limb of calyx with 5 obtuse, triangular, ciliate teeth; corolla white, becoming yellow on fading, pubescent, the tube 7–10 mm. long, the limb with 5 slightly irregular lobes, 8–12 mm. long; stamens exserted, the filaments hairy; berries separate, bright red. (*Mórrowi*, named for Dr. James Morrow, a famous traveler in Japan.)

Cultivated. Native of Japan.

A very handsome and hardy shrub, ornamental both in flower and fruit and covered with foliage from earliest spring until hard freezing in the fall. A very useful plant for untrimmed hedges where there is plenty of space. This plant grows readily from seed; it is distributed extensively by birds, and is apt to appear spontaneously in the vicinity of cultivated plants. Flowers in May and June, fruits from August to late autumn

9. ×Lonicera bella Zabel. Gartenfl. 38: 525. 1889.

L. Morrowi×tatarica.

A more upright shrub than *L. Morrowi*, twigs somewhat pubescent, leaves sparsely pubescent or nearly glabrous, truncate at the base, peduncles about 12 mm. long, bracts nearly orbicular, corolla either pink or white, becoming yellow with age. (*Bélla*, charming.)

A garden hybrid frequently planted.

10. Lonicera caerulea L. var. **villosa** (Michx.) T. & G. Fl. N. Am. 2: 9. 1841.

Xylosteum villosum Michx. 1803.

Erect shrub 3 dm. to 1 m. high with erect or ascending branches; bark brown, much shredded; twigs puberulent and generally sparsely villous; winter buds strongly ascending; leaves elliptical, narrow, oblong or obovate, 2–4 cm. long, 8–16 mm. wide, apex rounded or obtusely angled, rarely somewhat acute, generally mucronate, base rounded, upper surface dark green, more or less strigose pubescent, sometimes nearly glabrate, lower surface paler with strongly reticulate, prominent veins, villous, margin ciliate, petioles about 1 mm. long, villous; flowers in pairs from the axils of the lower leaves, peduncle 2–8 mm. long, villous, bracts at base of ovaries awl-shaped, 3–5 mm. long, hirsute; ovaries of the two flowers completely united, glabrous; limb of calyx minute, glabrous; corolla pale yellow, narrowly campanulate, glabrous or sparingly pubescent without, villous within, the tube slightly gibbous at the base, about 7 mm. long, the lobes nearly equal, about 5 mm. long; stamens exserted; fruit an oval, bluish black berry, bearing the scars of the two flowers close together at the summit, edible. (*Caerúlea*, blue, better spelled coerulea, but Linnaeus' original spelling is *ae*; *villósa*, villous.)

Wet woods and bogs, chiefly in the northeast corner of the state, but occurring as far south as Morrison and Anoka counties. Labrador to Alaska, southward chiefly in mountainous districts to Pennsylvania, Michigan, Minnesota, Yellowstone Park, and California.

This variety is the American representative of the polymorphic Old World *L. caerulea*. The typical species has spreading buds and branches, even more minute calyx, and conspicuously pubescent, funnel-shaped corolla. Specimens from the western United States have thinner and less veiny leaves than those from eastern North America. Some of the Minnesota and Wisconsin specimens agree in this respect with the eastern, some of them with the western form.

5. DIERVILLA Adans. Fam. 2: 157. 1763.

Upright shrubs; leaves opposite, serrate; flowers axillary and terminal, cymose or solitary; calyx tube slender and elongated, narrowed below the 5 persistent sepals; corolla tubular or funnel-shaped, the tube slightly gibbous at the base, 5-lobed; stamens 5, borne on the tube of the corolla, anthers

DIERVILLA LONICERA

linear; ovary 2-celled, inferior, ovules numerous in each cavity, style long and slender, stigma capitate; fruit a capsule, oblong, slender-beaked or pointed, 2-valved. (*Diervílla*, named for Dr. N. Dierville, who brought the plant to Tournefort.)

A genus of about 8 species, two of eastern North America, the others of eastern Asia. The Asiatic species are often regarded as forming a distinct genus, *Weigela*.

1. Native, flowers less than 2 cm. long, yellow — 1. *D. Lonicera*
2. Cultivated, flowers more than 2 cm. long, rose-pink or whitish — 2. *D. florida*

1. Diervilla Lonicera Mill. Gard. Dict. ed. 8. 1768.

Low, upright shrub 1 m. or less high; bark grayish brown, twigs glabrous except for two narrow hispid lines; leaves ovate or ovate-lanceolate, glabrous except a little rough hairy along the veins, finely serrate, long acuminate at the apex, wedge-shaped to rounded at the base, 6–13 cm. long, 2–7 cm. wide; petiole 5–10 mm. long; flowers terminal or axillary, in clusters of 2–6; sepals bristle-like, about 5 mm. long; corolla pale yellow, growing darker with age, funnel-shaped, about 1.5 cm. long, 1.5 cm. in diameter, the free portion of the petals linear. (*Lonicéra*, the honeysuckle.)

Throughout the wooded part of the state. Newfoundland to Manitoba, south to North Carolina, Indiana, and Minnesota.

2. Diervilla florida Sieb. & Zucc. Flor. Jap. 1: 75. 1835.

WEIGELA

Weigela florida DC. 1839.
Weigela rosea Lindl. 1846.

Shrub, 1–2 m. high; bark grayish brown, twigs hairy in two lines; leaves ovate to obovate, glabrous above, rough hairy along the veins beneath, finely serrate, acuminate at the apex, wedge-shaped or rounded at the base, 4–7 cm. long, 2.5–3.5 cm. wide; petiole about 2 mm. long; flowers axillary or terminal, in clusters of 1–4; sepals narrow lanceolate, about 1 cm. long, united for one-third to one-half of their length; corolla broad funnel-shaped, nearly regular, about 3 cm. long, 3.5 cm. in diameter, the free part of the petals broadly triangular, rose-pink or whitish in some varieties; stigma 2-lobed. (*Flórida*, flowering.)

Cultivated. Native of northern China.

A very ornamental shrub much cultivated under the name of "Weigela," and fairly hardy in the vicinity of Minneapolis where it blooms in early June. There are numerous hybrids between this and other related Asiatic species. They appear to be less hardy than *D. florida*.

COMPOSITAE ASTER FAMILY

Herbs, rarely shrubs or trees; flowers in dense heads, surrounded by a calyx-like involucre, the receptacle naked (i.e., bearing only flowers) or bearing scales among the flowers; flowers perfect, monoecious, polygamous or

dioecious; calyx adherent to the ovary, the free limb (pappus) variously modified as scales, spines, bristles, plumes, etc., or entirely wanting; petals 5, rarely 0, united, corolla either regular, tubular or bell-shaped, or irregular, 2-lipped, or flat and ligulate, the marginal flowers of the head often different in form from the central ones; stamens 5 or 0, usually united by their anthers; pistil 1, compound; ovary inferior, 1-celled, 1-seeded; style 1, 2-cleft above; stigmas 2; fruit an achene.

An immense family, the largest of flowering plants, containing about 13,000 species. Herbaceous species of this family are very abundant in our

DIERVILLA FLORIDA DIERVILLA LONICERA

flora, especially in prairie regions, comprising such well-known plants as sunflowers, asters, goldenrods, daisies, thistles, dandelions, etc. Woody plants, on the other hand, are rare and are largely confined to warmer climates, but the following mainly north temperate genus contains a number of shrubby and half-shrubby species.

1. ARTEMISIA L. Sp. Pl. 845. 1753.

WORMWOOD, SAGE-BRUSH

Herbs or shrubby plants, bitter and aromatic, often canescent or tomentose; leaves alternate; heads few- to many-flowered, pendulous or nodding,

in panicles, racemes, or spikes; flowers all tubular, greenish or yellowish; involucre ovoid, oblong, or hemispherical, its bracts imbricated in several series, the outer ones shorter; receptacle flat or convex, naked or pubescent, not chaffy; central flowers perfect, sometimes sterile, marginal flowers usually pistillate and fertile; achenes obovoid or oblong, 2-ribbed or striate, with a small rounded summit and no pappus. (*Artemísia*, the classical Gr. name of the wormwood, named for Artemisia, wife of Mausolus.)

ARTEMESIA FRIGIDA
(Single head ×2½, single flower ×10)

A genus of about 200 species, natives of the northern hemisphere and southern South America. Besides the following, several herbaceous species occur in Minnesota.

1. Plants 2–5 dm. high, densely silky canescent throughout; receptacle hairy (native) 1. *A. frigida*
2. Plants 7–10 dm. high, sparingly pubescent or nearly glabrous; receptacle naked (introduced) 2. *A. abrotanum*

1. Artemisia frigida Willd. Sp. Pl. 3: 1838. 1804.

MOUNTAIN SAGE

A low, tufted perennial, 2–5 dm. high, woody at the base, densely silky canescent throughout, aromatic; leaves 1–3 cm. long, pinnately parted and 3–5-cleft, the divisions linear, the leaves towards the base of the stems with shorter and slightly broader lobes, the upper ones sessile and less divided; heads globose, mostly numerous, in racemes or sometimes paniculate, short-peduncled, about 5 mm. long and 4 mm. broad; involucre hemispheric, bracts oblong, canescent; receptacle villous pubescent; central flowers fertile; achenes ovate, about 1 mm. long. (*Frígida*, frosty, referring to the white foliage.)

On dry prairies and in dry, rocky soil, common in the western and northwestern parts of the state as far southeast as Minneapolis, less frequent and local farther south. Distributed from Minnesota to British Columbia, south to Texas, New Mexico, and Oregon; also in Asia. Blossoms in August and September. The leaves appear in early April.

2. Artemisia Abrotanum L. Sp. Pl. 845. 1753.

SOUTHERNWOOD

A half-shrubby perennial, up to 1 m. high; stems reddish brown, slightly ridged, puberulent or at length glabrous; branches numerous, short ascending or erect; leaves 1.5–5 cm. long, glabrous or slightly pubescent, especially towards the base, once to thrice pinnately parted into linear lobes less than 1 mm. wide, the uppermost leaves frequently entire; inflorescence thyrsoidal, much branched and leafy, heads numerous, in slender racemes, nearly globose, nodding, 2–4 mm. in diameter; involucre hemispheric, somewhat pubescent, the outer bracts lanceolate, the inner oblong-ovate to narrowly obovate with broadly scarious margins, sometimes notched at the tips; receptacle naked; flowers numerous, small, yellowish, the central ones fertile; achenes glabrous, about 0.5 mm. long. (*Abrotánum*, classical Latin name for this plant.)

Native of southern Europe, frequently planted on account of its feathery fragrant foliage. Blossoms from September to October.

GLOSSARY

Abruptly pinnate. Pinnate without a terminal leaflet.

Achene. A dry, one-seeded fruit.

Acrid. Sharp, biting, and unpleasant to the taste.

Acuminate. Tapering into a long point.

Acute. Sharp-pointed.

Adherent. More or less grown together.

Adnate. United, grown to, as the inferior ovary with the receptacle.

Aerial. Growing in the air.

Aggregate. Grouped together.

Alternate. With a single leaf at each node.

Anatropous. Applied to an inverted ovule with the micropyle near the hilum.

Annual. Lasting only one growing season.

Anther. The upper part of the stamen containing the pollen.

Apetalous. Without petals.

Apex. Tip or upper end.

Apiculate. Tipped with a small point.

Apocarpous. Having, or consisting of, separate carpels or pistils.

Apopetalous. Having, or consisting of, separate petals.

Appendaged. With an addition or projection.

Appressed. Lying close to or against another part.

Aquatic. Growing in the water.

Aril. The fleshy, often bright-colored, outer coat of some seeds.

Aromatic. Spicy, fragrant.

Ascending. Growing obliquely upward.

Astringent. With a puckering taste.

Auricle. An appendage more or less ear-like in shape.

Awn. A slender, bristle-like structure.

Awn-pointed. Tipped with an awn.

Axil. The upper angle between leaf and stem.

Axillary. Borne in the axil of a leaf.

Axis. The part of a stem or branch that bears leaves, flowers, or flower parts.

Barbed. With a reflexed point like a fish-hook.

Basal. At the base or arising from it.

Beak. An elongated, tapering structure.

Bearded. With hairs or awns restricted more or less to a definite area.

Berry. A fleshy fruit with a thin skin or soft rind, the seeds imbedded in the pulp.

Bifoliolate. Consisting of two leaflets.

Bipinnate. Twice pinnate, i.e., with the primary pinnae again pinnately compound.

Biternate. With three divisions, each subdivided into three leaflets.

Blade. The flat part of a leaf.

Boreal. Northern.

Boss. A raised knob or disk.

Bract. A reduced leaf found below a flower or flower cluster.

Bracteole, bractlet. A small bract or scale on the pedicel below the flower.

Caducous. Dropping off very early compared with other parts.

Calcareous. Containing lime.

Calyx. The outer floral envelope, consisting of sepals; usually green but sometimes petal-like. When only one floral envelope is present it is considered to be the calyx.

Campanulate. Bell-shaped.

Cane. The elongated new shoot of bushes and shrubs.

Canescent. Gray and hoary in pubescence.

Capitate. Head-like.

Capsule. A dry, dehiscent fruit consisting of two or more carpels.

Carpel. A simple pistil or the unit part of a compound pistil.

Cartilaginous. Firm and tough, like cartilage.

Catkin. A spike-like inflorescence of inconspicuous flowers, usually subtended by scaly bracts, frequently drooping.

Cell. The cavity or chamber of an ovary.

Ciliate. Margined with hairs.

Claw. The narrowed lower part of a petal.

Cleft. Cut about halfway to the middle.

Coherent. United or clinging together.

Compound. Consisting of two or more similar parts united.

Compound leaf. A leaf with two or more completely separate blades or leaflets.

Concrescent. Grown together.

Cone. An elongated axis bearing stamens or ovule-bearing scales, as in the pine; a strobilus.

Connate-perfoliate. Applied to two or more leaves so united that the stem passes through the resulting structure.

Convolute. Overlapping, applied to a calyx or corolla in which each sepal or petal is external at one edge and internal at the other.

Cordate. Heart-shaped.

Coriaceous. Leathery in texture.

Corolla. The inner floral envelope consisting of petals, usually bright-colored.

Corymb. A flat-topped or convex flower cluster, blooming first at the edge.

Corymbose. Corymb-like; arranged as in a corymb.

Cotyledon. A seed leaf.

Crateriform. Goblet-shaped or deep saucer-shaped.

Creeping. Growing along the ground.

Crenate. Scalloped; with rounded, shallow teeth.

Crenulate. Finely crenate.

Cuneate. Wedge-shaped.

Cyme. A flower cluster blooming from the apex or middle first, usually somewhat flat.

Cymose. In a cyme; cyme-like.

Cymule. A small cyme.

Deciduous. Falling off, usually at the close of the season; applied also to trees and shrubs that shed their leaves in the autumn.

Decumbent. Reclining but with the summit ascending.

Decurrent. Running down the stem, as the base of some leaves.

Decussate. Alternating in pairs at right angles.

Deflexed. Bent down.

Dehiscent. Splitting open, used of pods, etc.

Deltoid. Triangular.

Dentate. Toothed, with the teeth directed outward.

Denticulate. Minutely dentate.

Depressed. Flattened from above.

Dichotomous. Two-forked.

Digitate. Diverging like the fingers of a hand.

Dilated. Broadened.

Dimorphous. Of two forms.

Dioecious. Bearing pistils and stamens on different plants.

Disk. A development of the receptacle at or around the base or summit of the ovary, frequently glandular.

Dissected. Cut or divided into numerous narrow segments.

Divided. Lobed nearly or quite to the base or midrib.

Drupe. A fleshy fruit with a pit or stone, such as the plum.

Drupelet. A small drupe.

Elliptic. Of oval outline, broadest about the middle.

Elliptic-lanceolate. Long and narrow, broadest about the middle.

Elongated. Long, drawn-out.

Emarginate. Indented at the apex.

Embryo. The young plant in a seed.

Endocarp. The inner wall of a fruit, as the stone of a plum.

Endosperm. The food supply stored about the embryo in many seeds.

Entire. Without teeth, lobes, or divisions.

Epidermis. The outer layer, the skin of plants.

Epigynous. Borne on the upper part of the ovary; applied also to a flower in which the perianth is so situated.

Even-pinnate. Pinnate without a terminal leaflet.

Exfoliate. To split or peel off, usually in thin layers.

Exocarp. The outer part or wall of a fruit.
Exserted. Projecting beyond the surrounding parts.
Exudation. Sap, resin, or milk that has oozed out, usually dried.

Falcate. Scythe-shaped, curved and flat, tapering gradually.
Fascicle. A cluster, usually dense.
Fascicled. Borne in dense clusters.
Fastigiate. Close, parallel, and upright.
Fertile. Bearing fruit; (of stamens) bearing pollen.
Fetid. Ill-smelling.
Fibrous. Composed of or resembling fibers.
Filament. The stalk of a stamen.
Filiform. Thread-like.
Fimbriate. Fringed.
Flexible. Bending readily.
Flower. An axis bearing stamens or pistils or both, and usually also sepals and petals.
Foliaceous. Leaf-like.
Follicle. A dry fruit of one carpel, splitting on one side only.
Fruit. A developing or ripened ovary, often with other adhering parts.

Genus. A group of related species, as the genus *Ulmus* (elm), the genus *Syringa* (lilac), embracing respectively all the kinds of elm and all the kinds of lilac.
Gibbous. Swollen.
Glabrate. Becoming nearly or quite smooth by the loss of pubescence.
Glabrous. Smooth, i.e., without hairs or any form of pubescence.
Gland. A surface or structure that produces nectar, resin, oil, etc.; often a small appendage or projection.
Glandular. Bearing glands, or gland-like.
Glaucescent. Somewhat bluish or whitish.
Glaucous. Covered with a bloom, a bluish or whitish wax coating.
Globose. Spherical or nearly so.
Glutinous. Sticky, glue-like.
Gynophore. A stalk that raises the ovary above the insertion of the other parts of the flower.

Habitat. The home of a plant.
Hastate. Arrow-shaped but with the basal lobes diverging.
Head. A dense cluster of sessile flowers.
Herb. A non-woody plant that dies annually, at least down to the ground.
Herbaceous. Herb-like.
Hip. The fleshy ripened receptacle of a rose, containing the bony achenes.
Hirsute. With somewhat coarse, stiff hairs.
Hispid. Rough, with stiff, bristly hairs.
Hybrid. A cross between two species.
Hypanthium. In a perigynous or epigynous flower, the cup-shaped, saucer-shaped, or tubular structure that bears the sepals, petals, and stamens.
Hypogynous. Situated on the receptacle beneath the ovary and free from it; applied also to a flower in which the perianth is so situated.

Imbricated. Overlapping like the shingles of a roof; in an imbricated calyx or corolla one sepal or petal must be wholly external and one wholly internal.
Incised. Cut sharply and irregularly, more or less deeply.
Included. Not projecting beyond the other parts.
Indehiscent. Applied to fruits that do not split to liberate the seeds.
Inferior. Applied to an organ situated below another one, especially to the ovary when below the other flower parts.
Inflorescence. A flower cluster.
Infrastipular. Below the stipules at the base of a leaf.
Integument. A protective layer or coat, as the covering of an ovule or a seed.
Internode. The part of the stem between two nodes.
Involucre. The group of leaves or bracts surrounding a head of flowers, as in the sunflower, or sometimes below a single flower or cluster of flowers.
Irregular. Applied to a flower in which the petals are unlike.

Keel. The two fused lower petals of the flower of the pea family.
Keeled. Ridged, like the keel of a boat.

Lacerate. Irregularly cleft, as if torn.
Laciniate. Cut into narrow, pointed lobes.
Lanceolate. Lance-shaped, long and narrow, widest below the middle.
Leaflet. A division of a compound leaf.
Leaf-scar. The scar left by the falling of a leaf.
Legume. A dry, dehiscent fruit of one carpel, splitting on two sides as in the pea and bean pods.
Lenticel. A corky projection or spot on the bark.
Linear. Long and narrow, with the sides nearly or quite parallel.
Lip. The upper and lower halves of an irregular corolla or calyx as in the snapdragon.
Lobe. Any segment of an organ, especially if rounded.
Lobed. Divided into or bearing lobes.
Loculicidal. Applied to a capsule that splits down the back of the chambers or cells.
Lustrous. Shining.

Membranous. Membrane-like, papery.
Micropyle. The opening through which the pollen tube enters the ovule.
Monoecious. Bearing stamens and pistils in different flowers of the same plant.
Monotypic. Used of a genus containing a single species.
Mucronate. Tipped with a sharp point.

Nerve. One of the principal veins of a leaf.
Net-veined. With veins running in various directions and connecting with one another.
Nodding. Hanging on a bent peduncle or pedicel.
Node. The part of the stem that normally bears a leaf or leaves.
Nut. A dry, one-seeded, indehiscent fruit with a stony shell or covering.
Nutlet. A diminutive nut.

Ob-. Prefix meaning reversed or inverted.
Obcordate. Reversed heart-shaped, the point of the heart downward.
Oblanceolate. Reversed lance-shaped, widest above the middle.
Oblique. Slanting.
Oblong-lanceolate. Lance-shaped but with nearly parallel sides.
Obovate. Reversed egg-shaped, broadest above the middle.
Obtuse. Blunt.
Odd-pinnate. Pinnate with an odd or unpaired leaflet at the tip.
Opposite. (Of leaves) directly across from each other at the same node; (of flower parts) in front of.
Ovate. Egg-shaped in outline.
Ovoid. Egg-shaped.
Ovule. The young unfertilized seed as found in the flower.

Palmate. Spreading from a common center like the fingers of the hand.
Panicle. A compound flower cluster of the racemose type.
Paniculate. In a panicle.
Papilionaceous. Butterfly-like, as the flowers of the pea family.
Papillose. With minute blunt projections.
Pappus. The bristles, hairs, awns, etc., found at the apex of the fruits of asters, dandelions, etc. It represents a modified calyx.
Parted. Deeply cut.
Pedicel. The stalk of a single flower.
Peduncle. The stalk of a flower cluster or of a solitary flower.
Peltate. Shield-shaped, the stalk attached at or near the middle of the lower surface.
Pendent. Hanging.
Pendulous. Hanging.
Perennial. Lasting from year to year.
Perfect. Having both stamens and pistils.
Perfoliate. Applied to a leaf having the stem apparently passing through it.
Perianth. The floral envelopes, calyx and corolla considered together, used also when the two envelopes are undifferentiated.
Pericarp. The wall of the fruit.

Perigynous. Borne on an hypanthium that is free from the ovary; applied also to a flower in which the perianth is so situated.

Persistent. Remaining after blooming or fruiting.

Petal. One of the parts of the corolla.

Petaloid. Petal-like, brightly colored.

Petiole. The stalk of a leaf.

Petiolule. The stalk of a leaflet.

Pinna. A leaflet of a pinnately compound leaf.

Pinnate. Arranged like the parts of a feather, applied to the veining, lobing, and compounding of leaves.

Pinnately compound. With leaflets on both sides of a common stalk.

Pinnatifid. Pinnately cleft to the middle or beyond.

Pistil. The seed-bearing organ of the flower.

Pistillate. Having pistils but not stamens.

Plumose. Plume-like or feathery.

Pod. A dry, dehiscent fruit.

Pollen. The (usually powdery) material produced in the anthers, consisting of microspores and necessary for the fecundation of the ovules.

Pollen grain. One of the microspores or grains that constitute pollen.

Pollination. The transfer of pollen from the anther to the stigma of the same or another flower.

Polygamo-dioecious. Polygamous and having the perfect and imperfect flowers on different plants.

Polygamo-monoecious. Polygamous and having the perfect and imperfect flowers on the same plant.

Polygamous. Having both perfect and imperfect (staminate or pistillate) flowers.

Polypetalous. Having separate petals.

Pome. A fleshy fruit with a core.

Prickle. A sharp, needle-like outgrowth of the epidermis.

Primary. Of the first rank.

Propagation. The process by which new individuals arise or are produced without the use of seed.

Prostrate. Lying flat upon the ground.

Puberulent, puberulous. Finely hairy.

Pubescent. Hairy.

Pungent. Sharp.

Pyriform. Pear-shaped.

Raceme. An inflorescence consisting of a somewhat elongated axis bearing a succession of axillary, pedicelled flowers.

Racemose. In a raceme or resembling a raceme.

Rachis. The axis of a compound leaf.

Radiate. Like the spokes of a wheel.

Ray. One of the ribbon-like flowers of the Compositae.

Receptacle. The end of a flower stalk bearing the flower parts or, in the Compositae, bearing the flowers.

Recurved. Bent backward or downward.

Reflexed. Abruptly bent backward or downward.

Regular. Having the members of each series alike in size and shape.

Reniform. Kidney-shaped.

Resinous, resiniferous. Bearing resin.

Reticulate. Net-like.

Reticulation. A net-like marking or roughening.

Retrorse. Turned downward or backward.

Revolute. With the margin rolled back.

Rhizome. An underground stem.

Rhombic. More or less diamond-shaped.

Rootstock. An undergound stem.

Rostrate. Beaked.

Rotate. Flat and circular in outline; wheel-shaped.

Rudimentary. Imperfectly developed.

Rugose. Wrinkled, roughened.

Salver-form, salver-shaped. With a slender tube, abruptly widened into a flat top.

Samara. A winged fruit, as in the elm and maple.

Scabrous. Rough.

Scale. A minute leaf, also any small, flat, superficial appendage.

Sclerenchyma. Hard, stone-like, or fibrous tissue.

Scurfy. With bran-like scales.
Segment. A part or division.
Segregate. To separate from.
Semiherbaceous. Partly herbaceous, woody only at the base.
Sepal. One of the outer cycle of flower parts, usually green, a division of the calyx.
Septicidal. Splitting through or along the septa or partitions of the fruit.
Septifragal. Where the valves in dehiscence break away from the partitions.
Serrate. Having teeth like a saw.
Serrulate. Finely serrate.
Sessile. Without a stalk, seated.
Sheath. The part of a leaf or leaf base that clasps or encloses the stem.
Shrub. A woody plant usually less than 20 feet high and generally with several stems from a common base.
Simple. Consisting of one part, not compound.
Sinuate. With wavy margins.
Sinus. The cleft or recess between two lobes.
Spatulate. Spoon-shaped, shaped like a spatula.
Species. A group of like individuals, as white pine, bur oak, etc.
Spike. An elongated axis bearing sessile flowers.
Spine. A sharp woody outgrowth of the stem; a reduced leaf or stipule.
Sporangium. A spore-bearing sac or structure.
Spray. A feathery branch.
Spur. A hollow projection from a sepal or petal.
Stamen. The part of the flower that bears the pollen.
Staminate. With stamens but without pistils.
Staminode. A rudimentary stamen that does not produce pollen.
Standard. The large upper petal of the flower of the pea family.
Stellate. Star-shaped.
Sterile. Not producing seeds; (of stamens) without pollen.
Stigma. The portion of the pistil that receives the pollen.
Stipel. A stipule of a leaflet.
Stipulate. Having stipules.
Stipule. A usually small blade-like structure at the base of the petiole.
Strap-shaped. Long and narrow in outline.
Striate. Marked with parallel lines.
Stolon. A runner or any basal branch that is disposed to root.
Stoloniferous. Bearing stolons.
Strigose. Having appressed, sharp, and stiff hairs.
Style. The stalk-like portion of the pistil connecting the stigma and the ovary.
Stylopodium. An enlargement at the base of the style.
Subcordate. Somewhat heart-shaped.
Submerged. Under water.
Subsessile. Nearly sessile.
Subtend. To stand below on the axis.
Subulate. Awl-shaped.
Sucker. A shoot arising from an underground bud.
Sulcate. Grooved or furrowed.
Superior. Applied to a part or organ placed above another one, especially to the ovary when it stands above the insertion of the other parts of the flower.
Sympetalous. Having or consisting of united petals.
Syncarpous. Having united carpels.

Teeth. Small projections along the leaf margin.
Tendril. A slender, coiling organ.
Terete. Having a circular cross-section.
Ternate. Of three leaflets.
Terrestrial. On the ground, not water-dwelling.
Thorn. A reduced, sharp-pointed branch.
Thyrse. A contracted, cylindrical or ovoid, usually compact panicle.
Tomentose. Having a dense mat or covering of hairs.
Tomentum. A dense layer of hairs.
Trailing. Creeping along the ground.
Tribe. A group of genera within a family.
Trifoliolate. Consisting of three leaflets.
Truncate. Cut off squarely.

Tubular. Like a tube.
Tundra. An arctic meadow or marsh.
Turion. A first-year cane, as in blackberries.
Twice-compound. With two sets or ranks of leaflets, i.e., with the primary leaflets again compound.
Twining. Winding spirally about a support.
Two-ranked. In two rows.

Umbel. A flower cluster with all the pedicels arising from the same point.
Umbellate. Borne in umbels.
Unarmed. Without thorns, spines, or prickles.

Valvate. Applied edge to edge without overlapping.
Valve. One of the portions into which dry fruits split; a trapdoor-like opening into the pollen chambers of some anthers.
Veins. Threads of fibro-vascular tissue in a leaf or other organ, especially those that branch (as distinguished from nerves).
Verticillate. Arranged in a whorl.
Vestigial. Reduced almost to disappearance.
Villous. Bearing long, soft hairs.

Webby. Bearing a tuft of slender, curly hairs.
Whorl. A group of three or more similar organs, such as leaves, radiating from the same node.
Whorled. Borne in a whorl.
Wing. Any membranous or thin expansion bordering or surrounding an organ; the lateral petals of the flower of the pea family.
Woolly. Covered with long and tortuous or matted hairs.

Zygomorphic. Applied to a flower with petals of different form.

INDEX

Synonyms are indicated in italics, new combinations and new names in bold face type.

Abies, 32
balsamea, 32
concolor, 33
Acanthopanax, 294
pentaphyllus, 295
Acacia, False, 239
Rose, 239
Acer, 259
ginnala, 263
Negundo, 266
Negundo var. interius, 267
Negundo var. violaceum, 267
nigrum, 264
platanoides, 266
platanoides f. globosum, 266
platanoides f. Reitenbachi, 266
platanoides f. Schwedleri, 266
rubrum, 261
saccharinum, 261
saccharum, 264
spicatum, 263
tataricum, 263
Aceraceae, 259
Aesculus, 267
glabra, 269
Hippocastanum, 268
Alder, 102
Black, 253
Dwarf, 271
Green, 102
Hoary, 103
Mountain, 102
Speckled, 103
White, 304
Almond, Flowering, 232
Alnus, 102
crispa, 102
incana, 103
Amelanchier, 213
alnifolia, 216
Bartramiana, 219
Botryapium, 218
Canadensis, 218
Canadensis, 217
florida, 216
humilis, 216
laevis, 217
oblongifolia, 216
oligocarpa, 219
rotundifolia, 214
sanguinea, 214
spicata, 214, 216
stolonifera, 219
Amorpha, 236
canescens, 236
fruticosa, 236
microphylla, 237
nana, 237
Ampelopsis Engelmanni, 280
Anacardiaceae, 246
Andromeda, 311
glaucophylla, 311
Angelica, Chinese, 294
Angiospermae, 53
Apple, 197
Thorn, 201
Aquifoliaceae, 251
Aralia, 293
chinensis, 294
chinensis var. manchurica, 294
hispida, 294
Araliaceae, 293
Arbor Vitae, 46
Arbutus, Trailing, 310
Arctostaphylos, 313
Uva-ursi, 313
Uva-ursi var. adenotricha, 314
Uva-ursi var. coactilis, 314
Aristolochia, 126
macrophylla, 126
Sipho, 126
Aristolochiaceae, 125
Aronia, 192
arbutifolia, 192
melanocarpa, 192
nigra, 192
Arrow-wood, 344

Artemisia, 363
frigida, 365
Abrotanum, 365
Ash, 325
Black, 328
Green, 327
Mountain, 193
Prickly, 242
Red, 327
White, 325
Asp, Quaking, 59
Aspen, American, 59
Large-toothed, 58
Aster Family, 362
Atragene americana, 131

Balm of Gilead, 57
Barberry, 128
common, 128
Japanese, 129
Barberry Family, 128
Basilima sorbifolia, 177
Basswood, 281, 283
Batidaea itascica, 161
subarctica, 161
Bayberry Family, 86
Bearberry, 313
Beech, 104
Blue, 92
Beech Family, 104
Berberidaceae, 128
Berberis, 128
Thunbergii, 129
vulgaris, 128
vulgaris f. atropurpurea, 129
Betula, 94
alba, 97
alba laciniata, 98
alba var. *papyrifera*, 95
cordifolia, 96
laciniata, 97
lutea, 98
nigra, 98
papyrifera, 95
pendula, 97
pendula f. dalecarlica, 97
pumila var. glandulifera, 99
Purpusii, 101
Sandbergi, 100
verrucosa, 97
Betulaceae, 88
Bignonia Family, 336
Bignoniaceae, 336
Billberry, 318
Dwarf, 318
Birch, 94
Canoe, 95
Cut-leaf Weeping, 97
Dwarf, 99
European White, 97
Low, 99
Paper, 95
Red, 98
River, 98
Yellow, 98
Birch Family, 88
Birthwort, 126
Birthwort Family, 125
Bitternut, 86
Bittersweet, Climbing, 257
Shrubby, 256, 257
Bittersweet Family, 254
Blackberry, 155
Bailey's, 167
High-bush, 162
Leafy-flowered, 165
Low-bush, 168
Tall, 164
Bladder-nut, 257
American, 258
Bladder-nut Family, 258
Blueberry, 316, 319, 321
Box Elder, 266
Bramble, 155
Bridal Wreath, 172, 173
Brier, Austrian, 189
Sweet, 188
Buckeye, 267
Fetid, 269
Ohio, 269
Buckthorn, 270, 271
Alder, 271
Buckthorn Family, 270
Buffalo-berry, 291, 292
Canadian, 292
Burning Bush, 256
Buttercup Family, 130
Butternut, 80
Buttonbush, 339, 340
Buttonwood, 152

Caprifoliaceae, 341
Caprifolium proliferum, 356
Caragana, 239
arborescens, 241
arborescens var. pendula, 242
digitata, 240
frutescens, 240
frutex, 240
pygmaea, 240
Carpinus, 91
caroliniana, 92
Carya, 84
cordiformis, 86
ovata, 84
Castanea dentata, 104
Catalpa, 337
bignonioides, 339
Catalpa, 339
Hardy, 337
ovata, 339
speciosa, 337
Ceanothus, 272
americanus, 274
ovatus, 274
ovatus var. pubescens, 274
Cedar, White, 46
Red, 48, 49
Celastraceae, 254
Celastrus, 256
scandens, 257
Celtis, 122
crassifolia, 123
occidentalis, 122
occidentalis var. crassifolia, 123
Cephalanthus, 339
occidentalis, 340
Chaenomelis, 191
Maulei, 191
Chamaedaphnae, 310
caliculata, 310
Checkerberry, 312
Cherry, 220
Appalachian, 229
Cabinet, 223
Choke, 223
Compass, 227
Cornelian, 296
European Bird, 221
Flowering, 232
Morello, 227
Nankin, 230
Pin, 226
Rum, 223
Sand, 229
Sour, 227
Western Sand, 230
Wild Black, 223
Wild Red, 226
Zumbra, 227
Chestnut, 104
Chimaphila, 305
maculata, 306
umbellata var. cisatlantica, 305
Chiogenes, 315
hispidula, 315
Chionanthus, 329
virginica, 329
Chokeberry, 192
Black, 192
Red, 192
Cinquefoil, 153
Shrubby, 154
Cistaceae, 286
Clematis, 130, 132
paniculata, 132
verticillaris, 131
virginiana, 131
Clethra, 304
alnifolia, 304
Clethraceae, 303
Coffee-tree, Kentucky, 233
Compositae, 362
Comptonia, 88
asplenifolia, 88
peregrina, 88
Coniferae, 29
Cornaceae, 295
Cornus, 295
alba, 302
alternifolia, 297
Baileyi, 303
candidissima, 300
circinata, 300
florida, 296
mas, 296
mas f. aureo-elegantissima, 297
obliqua, 299
paniculata, 300
Purpusii, 299
rugosa, 300

Cornus stolonifera, 301
tatarica, 302
Corylus, 89
americana, 90
rostrata, 91
Cotinus, 251
coggygria, 251
Cotoneaster, 212
lucida, 212
Cottonwood, 59
Crab, Bechtel's Double-flowering, 199
Flowering, 201
Iowa, 199
Plum-leaf, 200
Soulard's, 200
Wild, 199
Cranberry, 316
High-bush, 347
Large, 324
Mountain, 322
Small, 323
Crataegus, 201
Calpodendron, 206
Crus-Galli, 204
Douglasii, 210
fluviatilis, 210
macracantha, 205
macrosperma, 211
mollis, 209
monogyna, 203
pertomentosa, 206
punctata, 204
roanensis, 210
rotundifolia, 207
rotundifolia var. pubera, 208
submollis, 208
succulenta, 205
tomentosa, 206
Crowberry, 246
Crowberry Family, 245
Cucumber Tree, 127
Cupressaceae, 46
Currant, 138
Black, 144
Flowering, 145
Golden, 145
Mountain, 140
Red, 142
Skunk, 140
Swamp Black, 139
Swamp Red, 142
Wild Black, 143
Cydonia japonica, 191
Cypress Family, 46

Dasiphora fruticosa, 154
Dewberry, 165, 167
Dicotyledons, 54
Diervilla, 360
florida, 362
Lonicera, 362
Dirca, 288
palustris, 289
Dogwood, 295
Alternate-leaved, 297
Panicled, 300
Red-osier, 301
Round-leaved, 300
Siberian, 302
Dogwood Family, 295
Dutchman's Pipe, 126

Elaeagnaceae, 289
Elaeagnus, 289
angustifolia, 291
argentea, 291
Elder, 341
American, 342
Box, 266
Common, 342
European, 344
Red-berried, 342
Empetraceae, 245
Empetrum, 245
nigrum, 246
Elm, 117
American, 119
Common, 119
Cork, 118
English, 121
Red, 120
Rock, 118
Siberian, 121
Slippery, 120
White, 119
Elm Family, 117
Epigaea, 310
repens, 310
Ericaceae, 304

Evonymus, 254
atropurpurea, 256
europaea, 256

Fagaceae, 104
Fagus grandiflora, 104
False Acacia, 239
False Indigo, 236
Fragrant, 237
Fir, 32
Balsam, 32
Douglas, 33, 34
Scotch, 44
Five Finger, 153
Forsythia, 334
suspensa, 334
viridissima, 335
Fraxinus, 325
americana, 325
lanceolata, 327
nigra, 328
pennsylvanica, 327
pennsylvanica var. lanceolata, 327
viridis, 327
Fringe Tree, 329

Gaultheria, 312
procumbens, 312
Gaylussacia, 316
baccata, 316
resinosa, 316
Ginkgoaceae, 27
Ginkgoales, 27
Ginkgo, 27
biloba, 27
Ginkgo Family, 27
Gleditsia, 234
triacanthos, 234
triacanthos var. inermis, 234
Ginseng Family, 293
Gooseberry, 138
Garden, 148
Northern, 147
Prickly, 145
Grape, 275
Blue, 277
Frost, 276
Northern Fox, 276
River Bank, 276
Winter, 277
Grape Family, 274
Greenbrier, 53
Prickly, 54
Grossularia Cynosbati, 145
hirtella, 149
missouriensis, 146
oxyacanthoides, 147
reclinata, 148
Gymnocladus, 233
dioica, 233
Gymnospermae, 27

Hackberry, 122
Hamamelidaceae, 150
Hamamelis, 150
virginiana, 150
Hardhack, 176
Haw, Black, 348
Hawthorn, 201
English, 203
Hazel, 89
Beaked, 91
Hazelnut, 90
Heath Family, 304
Hemlock, 34, 35
Hickory, 84
Shagbark, 84
Shellbark, 84
Swamp, 86
Hicoria, 84
ovata, 84
Holly, 252
Mountain, 253
Holly Family, 251
Honeysuckle, 353
Tartarian, 359
Trumpet, 355
Twin, 359
Honeysuckle Family, 341
Hop Tree, 243, 245
Hornbeam, 91
American, 92
Hop, 93
Horse-Chestnut, 267, 268
Huckleberry, 316
Hudsonia, 287
tomentosa, 287
tomentosa var. intermedia, 287
Hydrangea, 136
arborescens, 137

Hydrangea, arborescens var. cordata f. grandiflora, 137
Hills of Snow, 137
paniculata, 137
paniculata var. grandiflora, 138
"Peegee," 138

Indian Bean, 339
Indigo, False, 236
Ilex, 252
verticillata, 253
Ironwood, 93
Ivy, Boston, 279
Poison, 250

Juglandaceae, 78
Juglans, 80
cinerea, 80
nigra, 82
June-berry, 213, 218
Juniper, 51
Prostrate, 51
Swedish, 51
Juniperus, 51
chinensis, 49
communis var. depressa, 51
communis var. suecica, 51
Sabina var. *procumbens*, 49
virginiana, 49

Kalmia, 308
glauca, 309
polifolia, 309

Labrador Tea, 307
Larch, 39, 41
American, 40
Larix, 39
americana, 40
decidua, 41
europaea, 41
laricina, 40
Larix, 41
Laurel, American, 308
Swamp, 309
Lead Plant, 236
Leather Leaf, 310
Leatherwood, 288, 289
Leatherwood Family, 288
Ledum, 307
groenlandicum, 307
Leguminosae, 232
Lepargyraea argentea, 292
canadensis, 292
Lilac, 329
Common, 331
Japanese Tree, 334
Persian, 332
Rouen, 332
Liliaceae, 53
Lily Family, 53
Linden, 281
American, 283
Large-leaved, 284
Small-leaved, 283
Summer, 284
Winter, 283
Linden Family, 281
Locust, 238
Common, 239
Bristly, 239
Honey, 234
Lonicera, 353
bella, 360
canadensis, 358
ciliata, 358
caerulea var. villosa, 360
dioica, 355
dioica var. glaucescens, 355
glauca, 355
glaucescens, 355
hirsuta, 357
Morrowi, 359
oblongifolia, 357
parviflora, 355
prolifera, 356
sempervirens, 355
Sullivantii, 356
tatarica, 359
Lycium, 335
chinense, 336
halimifolium, 335
vulgare, 335

Madder Family, 339
Magnoliaceae, 126
Magnolia, 127
acuminata, 127
Magnolia Family, 126

Maiden-hair Tree, 27
Malus, 197
baccata, 200
floribunda, 201
Halliana var. Parkmanii, 200
ioensis, 199
ioensis f. plena, 199
Malus, 198
prunifolia, 200
pumila, 198
Soulardi, 200
sylvestris, 198
Maple, 259
Black Sugar, 264
Hard, 264
Mountain, 263
Norway, 266
Red, 261
Siberian, 263
Silver, 261
Soft, 261
Sugar, 264
Swamp, 261
Tartarian, 263
Maple Family, 259
Matrimony Vine, 335
Chinese, 336
Menispermaceae, 132
Menispermum, 132
canadense, 132
Menziesia, 308
glabella, 308
Mespilus canadensis, 218
Mock Orange, 134, 135
Monocotyledons, 53
Moonseed, 132
Moonseed Family, 132
Moosewood, 288
Moraceae, 124
Morus, 124
alba, 125
rubra, 124
Mulberry, 124
Red, 124
White, 125
Mulberry Family, 124
Mountain Ash, 193, 196
Oak-leaved, 197
Myricaceae, 86
Myrica, 86
asplenifolia, 88
Gale, 87

Nannyberry, 348
Nemopanthus, 253
mucronata, 253
New Jersey Tea, 274
Nightshade Family, 335
Ninebark, 169
Common, 170

Oak, 105
Black, 110
"Black," 109
Bur, 113
Chinquapin, 117
Hill's, 109
Northern Bur, 114
Northern Pin, 109
Northern Red, 106
Poison, 249
Scarlet, 108
Swamp White, 116
White, 111
Oleaceae, 324
Oleaster Family, 289
Olive Family, 324
Olive, Russian, 291
Opulaster, opulifolius, 170
Ostrya, 93
virginiana, 93
Oxycoccus macrocarpus, 324
Oxycoccus, 323
palustris, 323

Parthenocissus, 277
Engelmanni, 280
quinquefolia, 279
quinquefolia var. hirsuta, 280
quinquefolia var. Saint Paulii, 280
tricuspidata, 279
vitacea, 281
Pea Family, 232
Pea-tree, 239
Dwarf Russian, 240
Shrubby, 240
Siberian, 241
Pepper Bush, Sweet, 304

Philadelphus, 134
coronarius, 135
grandiflorus, 135
Lemoinei, 135
Physocarpus, 169
opulifolius, 170
opulifolius var. intermedius, 171
Picea, 35
Abies, 39
canadensis, 38
Engelmanni, 39
excelsa, 39
glauca, 38
mariana, 37
pungens, 38
Pinaceae, 31
Pine, 41
Austrian, 45
Jack, 45
Mugho, 44
Norway, 44
Red, 44
Scotch, 44
Swiss Mountain, 44
White, 42
Pine Family, 31
Pinus, 41
Banksiana, 45
divaricata, 45
Laricio var. *austriaca*, 45
montana, 44
Mughus, 44
nigra, 45
resinosa, 44
sylvestris, 44
Strobus, 42
Pipsissewa, 304
Plane Tree, 152
Plane Tree Family, 150
Platanaceae, 150
Platanus, 152
occidentalis, 152
Plum, 220
Canada, 225
Flowering, 231
Newport, 225
Wild, 225, 226
Poison Ivy, 250
Poison Oak, 249
Poison Sumac, 249
Poplar, 54
Balsam, 56
Lombardy, 60
Norway, 61
Silver-leaf, 55
Trembling, 59
Populus, 54
alba, 55
alba var. *Bolleana*, 56
alba var. nivea, 56
alba var. pyramidalis, 56
balsamifera, 56
balsamifera, 59
candicans, 57
deltoides, 59
Eugenei, 61
grandidentata, 58
nigra var. italica, 60
tacamahacca, 56
tremuloides, 59
Potentilla, 153
fruticosa, 154
fruticosa var. tenuifolia, 155
Prunus, 220
americana, 226
Besseyi, 230
cerasifera var. Pissardii, 225
Cerasus, 227
cuneata, 229
glandulosa, 232
Knudsoni, 227
nigra, 225
Padus, 221
pennsylvanica, 226
pumila, 229
serotina, 223
susquehanae, 229
tomentosa, 230
triloba, 231
virginiana, 223
zumbra, 227
Pseudotsuga, 33
Douglasii, 34
mucronata, 34
taxifolia, 34
Ptelea, 243
trifoliata, 245
Pulse Family, 232
Pyrus baccata, 200
Botryapium, 218

Pyrus, coronaria var. *ioensis*, 199
Halliana, 200
ioensis, 199
japonica, 191
malus, 198
prunifolia, 200
pulcherrima, 201

Quercus, 105
alba, 111
bicolor, 116
borealis, 106
borealis var. maxima, 107
coccinea, 108
ellipsoidalis, 109
macrocarpa, 113
macrocarpa var. olivaeformis, 114
olivaeformis, 114
palustris, 110
platanoides, 116
prinoides, 117
rubra, 107
rubra var. *ambigua*, 106
Schuettii, 116
velutina, 110
Quince, Japanese, 191

Ranunculaceae, 130
Raspberry, 155
Arctic, 158
Black, 161
Dwarf, 158
European, 159
Wild Red, 159
Red-root, 272
Smaller, 274
Rhamnaceae, 270
Rhamnus, 270
alnifolia, 271
cathartica, 271
Frangula, 271
Rhodotypos, 169
kerrioides, 169
scandens, 169
tetrapetala, 169
Rhus, 246
canadensis, 251
glabra, 248
glabra f. laciniata, 249
hirta, 248
toxicodendron, 250
toxicodendron var. radicans, 250
typhina, 248
typhina f. dissecta, 248
Vernix, 249
Ribes, 138
alpinum, 140
americanum, 143
aureum, 145
Cynosbati, 145
floridum, 143
gracile, 146
Grossularia, 148
Grossularia var. Uva-crispa, 149
hirtellum, 149
hudsonianum, 144
lacustre, 139
missouriense, 146
nigrum, 144
odoratum, 145
oxyacanthoides, 147
prostratum, 140
triste, 142
Uva-crispa, 149
vulgare, 142
Rock-rose Family, 286
Robinia, 238
hispida, 239
Pseudo-Acacia, 239
Rosaceae, 152
Rosa, 177
acicularioides, 184
acicularis, 181
acicularis var. Bourgeauiana, 182
acicularis var. rotunda, 182
arkansana, 184
arkansana var. Bushii, 185
arkansana var. suffulta, 185
blanda, 183
blanda var. acicularioides, 184
blanda var. glabra, 183
Bourgeauiana, 182
Bushii, 185
carolina, 179
centifolia, 188
centifolia f. muscosa, 188
cinnamonea, 187
eglanteria, 188, 189
foetida, 189
gallica, 187

Rosa, Hugonis, 189
humilis, 179
Macounii, 180
multiflora var. cathayensis, 190
pimpinellifolia, 189
polyanthema, 184
pratincola, 185
rubiginosa, 188
rugosa, 187
Sayi, 181
setigera, 190
spinosissima, 189
subblanda, 183
suffulta, 185
Woodsii, 181
Woodsii, 180
Rose, 177
Cabbage, 188
Cinnamon, 187
Guelder, 348
Moss, 188
Prairie, 190
Prairie Wild, 184
Prickly Wild, 181
Rambler, 190
Scotch, 189
Smooth Wild, 183
Rose Family, 152
Roses, Garden, 191
Rowan Tree, 196
Rubus, 155
allegheniensis, 162
arcticus var. grandiflorus, 158
argutus, 164
Baileyanus, 167
idaeus, 159
idaeus var. *canadensis*, 161
flagillaris, 165
frondosus, 165
neglectus, 162
nigrobaccus, 162
nigrobaccus var. sativus, 164
occidentalis, 161
parviflorus, 157
plicatifolius, 167
procumbens, 165
pubescens, 158
setosus, 168
strigosus, 159
strigosus var. canadensis, 161
triflorus, 158
vermontanus, 169
villosus, 165
Rubiaceae, 339
Rue Family, 242
Rutaceae, 242

Sabina, 47
chinensis, 49
horizontalis, 49
prostrata, 49
virginiana, 49
Sage-brush, 363
Sage, Mountain, 365
Salicaceae, 54
Salix, 62
alba, 69
alba var. vitellina, 70
amygdaloides, 64
Bebbiana, 74
babylonica, 68
balsamifera, 70
blanda, 68
candida, 73
candida var. denudata, 74
cordata, 71
discolor, 75
discolor var. eriocephala, 76
discolor var. Overi, 76
fluviatilis, 67
fragilis, 68
humilis, 76
humilis var. keweenawensis, 77
interior, 67
longifolia, 67
lucida, 65
missouriensis, 72
nigra, 65
pedicellaris var. hypoglauca, 70
pendulina, 68
pentandra, 66
petiolaris, 72
planifolia, 74
pyrifolia, 70
rostrata, 74
serissima, 66
tristis, 77
Salmon-berry, 157
Sambucus, 341
canadensis, 342

Sambucus, canadensis var. laciniata, 344
nigra, 344
nigra var. laciniata, 344
pubens, 342
racemosa var. laciniata, 342
Sapindaceae, 267
Sarsaparilla, Bristly, 294
Saskatoon, 213, 216
Savin, 47, 49
Creeping, 49
Saxifragaceae, 133
Saxifrage Family, 133
Service-berry, 213
Shepherdia, 291
argentea, 292
canadensis, 292
Shoe-strings, 236
Silver-berry, 291
Smilax, 53
hispida, 54
Smoke Tree, 251
Snow-ball, 348
Snowberry, 350, 351
Creeping, 315
Soapberry Family, 267
Solanaceae, 335
Sorbaria, 176
sorbifolia, 177
Sorbus, 193
americana, 194
Aucuparia, 196
quercifolia, 197
sambucifolia, 195
semipinnata, 197
subvestita, 195
Southernwood, 365
Spindle Tree, 254
European, 256
Spiraea, 171
alba, 174
arguta, 173
Billiardii, 175
Bumalda, 174
Bumalda f. Anthony Waterer, 174
Bumalda f. Froebelii, 174
japonica, 174
opulifolia, 170
prunifolia, 172
salicifolia, 174
sorbifolia, 177
Thunbergii, 172
tomentosa var. rosea, 175
Van Houttei, 173
Spirea, 171
Japanese, 174
Spruce, 35
Black, 37
Colorado Blue, 38
Engelmann's, 39
Norway, 39
White, 38
Squashberry, 345
Staphylea, 257
trifolia, 258
Staphyleaceae, 257
Steeple-bush, 176
Sudden Sawlog, 61
Sumac, 246
Cut-leaf, 248
Poison, 249
Scarlet, 248
Staghorn, 248
Sweet-scented, 251
Upland, 248
Sumac Family, 246
Sweet Fern, 88
Sweet Gale, 87
Sycamore, 152
Symphoricarpos, 350
albus, 351
albus var. laevigatus, 352
albus var. pauciflorus, 352
occidentalis, 350
racemosus, 351
Syringa, 134, 329
amurensis, 333
amurensis var. japonica, 334
chinensis, 332
Garden, 135
Josikaea, 333
Large-flowered, 135
persica, 332
rothomagensis, 332
villosa, 332
vulgaris, 331

Tacamahac, 56
Tamarack, 39, 40
Tamaricaceae, 284

Tamarisk, 284
Tamarisk Family, 284
Tamarix, 284
gallica, 286
hispida, 286
odessana, 286
pentandra, 286
Taxaceae, 29
Taxus, 29
baccata var. *minor*, 31
canadensis, 31
cuspidata, 31
Tea, Labrador, 307
New Jersey, 274
Thimble-berry, 157, 161
Thorn Apple, 201
Thorn, Box, 335
Cock-spur, 204
Newcastle, 204
Thuja, 46
occidentalis, 46
Thymelaeaceae, 288
Tilia, 281
americana, 283
cordata, 283
platyphyllos, 284
Tiliaceae, 281
Tsuga, 34
canadensis, 35

Ulmaceae, 117
Ulmus, 117
americana, 119
campestris, 121
fulva, 120
glabra, 121
pumila, 121
racemosa, 118
Thomasii, 118

Vaccinium, 316
album, 351
caespitosum, 318
canadense, 321
macrocarpon, 324
pennsylvanicum, 319
pennsylvanicum var. myrtilloides, 321
pennsylvanicum var. nigrum, 320
Oxycoccos, 323
uliginosum, 318
Vitis-Idaea var. minus, 322
Viburnum, 344
affine, 349
affine var. hypomalacum, 350
americanum, 347
Lantana, 348
Lentago, 348
Opulus, 347
Opulus var. *americanum*, 347
Opulus var. roseum, 348
pauciflorum, 345
trilobum, 347
Virginia Creeper, 277, 279
Virgin's Bower, 130
Purple, 131
Virginia, 131
Vitaceae, 274
Vitis, 275
bicolor, 277
labrusca, 276
vulpina, 276

Wahoo, 256
Walnut, 80
Black, 82
White, 80
Walnut Family, 78
Wayfaring Tree, 348
Weigela, 362
florida, 362
rosea, 362
White Alder Family, 303
Willow, 62
Autumn, 66
Balsam, 70
Bay-leaved, 66
Beaked, 74
Bebb's, 74
Black, 65
Bog, 70
Crack, 68
Dwarf Gray, 77
Glaucous, 75
Golden, 70
Heart-leaved, 71
Hoary, 73
Laurel-leaved, 66
Missouri, 72
Niobe Weeping, 70
Peach-leaved, 64

Willow, Prairie, 76
Pussy, 75
Sage, 73, 77
Sandbar, 67
Shining, 65
Slender, 72
Weeping, 68
White, 69
Wisconsin Weeping, 68
Winterberry, Virginia, 253
Wintergreen, 312
Witch-hazel, 150
Witch-hazel Family, 150
Wolfberry, 350
Woodbine, 277, 279
Wormwood, 362

Xylosteum oblongifolium, 358
villosum, 360

Yew, 29
American, 31
Japanese, 31
Yew Family, 29

Zanthoxylum, 242
americanum, 242

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